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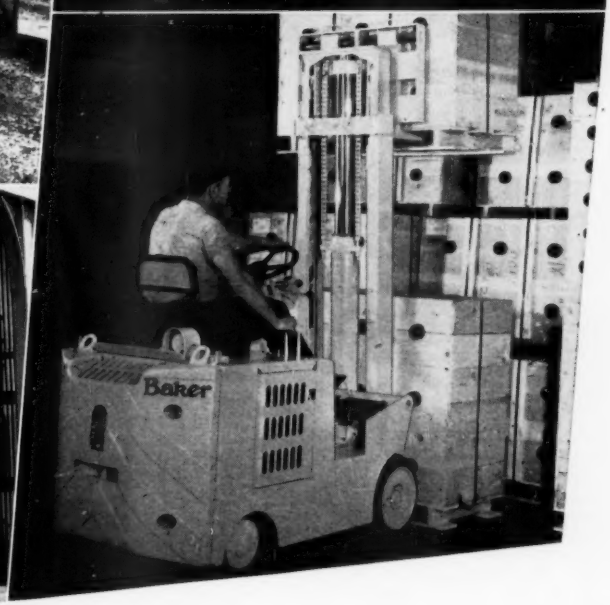
BAKER TYPE FG STRAIGHT GAS



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Outstanding gas truck in the Baker line is the GAS-O-MATIC. The gas engine drives the exclusive GAS-O-MATIC generator to supply power to the Baker electric motor—giving electric truck performance and operating economy at premium gas truck initial cost. Gas consumption for normal service of 2-ton model about ½ gallons per hour. Capacities 4,000 to 6,000 pounds.

Descriptive bulletins are available. Write the Baker-Raulang Company, 1251 West 80th Street, Cleveland 2, Ohio.

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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

Visit Us at Booth 601

MARK THIS number — 601 — in your memo pad. The editorial staff of Plant Engineering will have the red carpet and easy chairs ready to welcome you during your visit to the Plant Maintenance and Engineering Show, Chicago, January 24 to 27.

If you have any complaints, problems or just want to sit and chat, one of the editors will be present in the booth at all times to take care of your needs. See you at booth 601.

Reducing Tool Costs

ARE YOUR TOOL servicing costs on the increase? If so, the answer to your problem may be a tool loan receipt system. Tool loan systems should be tailored to fit the conditions in the particular plant in which it is used.

To help you go about setting up such a system a 32-page bulletin, published by the Virginia Polytechnic Institute, enumerates the steps to consider for adopting such a system.

This bulletin, entitled "Reducing Tool and Tool Service Costs with a Tool Loan Receipt System," by Prof. C. A. Horst, may be obtained by writing to Virginia Polytechnic Institute, for Engineering Experiment Station Series No. 93, Blacksburg, Virginia. Cost per bulletin is 25 cents.

AISE Convention Speakers

THIS YEAR'S four-day convention of the Association of Iron and Steel Engineers, held at the Cleveland Public Auditorium, was attended by one of PLANT ENGINEERING's editors, **Emil B. Skubik.**

Following is a brief report of several of the numerous technical sessions presented at the conference:

John C. Lantz, Maintenance Foreman in the Steel and Tube Division of the Timken Roller Bearing Co., Canton, Ohio, was one of the speakers at the 1954 convention of the Association of Iron and Steel Engineers in Cleveland, Ohio. He presented a paper which was co-authored by another Timken man, Frank C. Wier, Superintendent of Material Handling. It dealt with the company's unusual system for the maintenance of mobile equipment. The repair operations reportedly are centralized in a Quonset-type building which has been enlarged since its construction. Visible files are used in the setup to help mechanics get parts.

Stanley A. Nelson, Supervisor of Plant Engineering, John Deere and Co., Moline, Illinois, spoke at one of the combustion sessions of the AISE convention. His paper, entitled, "A Power Plant Report to Management," covered the value of paperwork to promote efficient operation of industrial power plants. In his organization, reports are sent from each plant periodically to a central engineering office and then to top company people for review. Thus they serve as a yardstick for comparison of the performances of various plants.

Open Invitation to AIPE Luncheon

MEMBERS OF THE American Institute of Plant Engineers are planning to hold an informal luncheon during the coming Plant Maintenance and Engineering Show and Conference, at Chicago, January 24 to 27. All plant engineers attending this conference are cordially invited to take part in this luncheon.

Further details on just what day it will be held will be mentioned in this column in the January issue.

Don't Forget Your Reservation

USE OF THE new hall, a recent addition to the International Amphitheatre, Chicago, will permit all general sessions of the Plant Maintenance and Engineering Conference to be held in the arena, directly adjoining the exhibits.

Mark these dates in your calendar: The conference and show will be held from January 24 through January 27. Thirty-seven sessions have been arranged for the conference.

Separate roundtable sessions will be set up for each of five industries. These include the chemical industry, food, paper, steel and textiles. One sectional conference will be devoted to the process industries.

Some of the ten topics to be considered at the general sessions will be: Advantages of Planning and Scheduling Maintenance Work; Limitations of Planning and Scheduling; Planning and Scheduling in Large and Medium-Size Plants; Selection, Indoctrination and Evaluation of Maintenance People; Communicating Information from Man-

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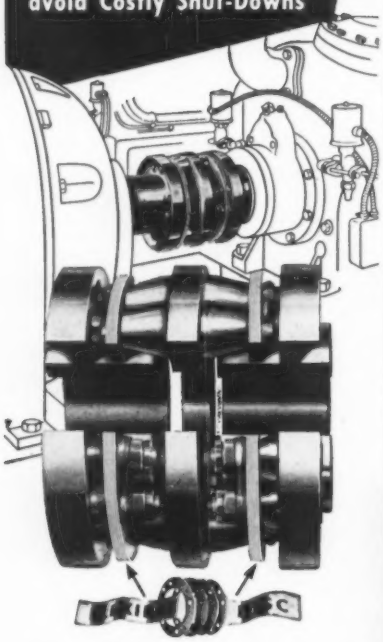

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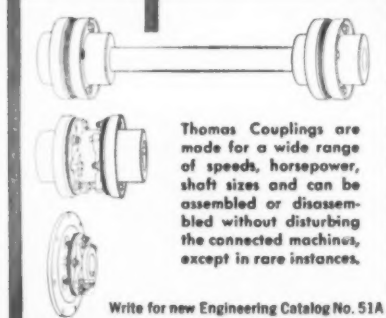

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'ROUND ABOUT

agement to Maintenance Personnel and Vice Versa; and Getting Along with the Unions.

In addition to the general sessions there will be eight sectional conferences and sixteen roundtable discussions dealing with various phases of maintenance.

Advance registration cards for both the show and conference may be obtained by writing to the Editor, PLANT ENGINEERING, 110 South Dearborn St., Chicago 3, Illinois, or addressing your inquiry to Clapp and Poliak, Inc., 341 Madison Ave., New York 17, N. Y.

Recent Appointments at Hooker

APPOINTMENTS OF **Raymond S. Briggs** and **Richard W. Lyke** to the positions of assistant chief engineer and plant engineer, respectively, of the Hooker Electrochemical Co., Niagara Falls, N. Y., were recently announced.

Mr. Briggs has been plant engineer since 1941. He joined the company as a draftsman in 1933 and worked in the engineering department until 1941 when he was appointed plant engineer.

R. S. Briggs

R. W. Lyke

Mr. Lyke came to Hooker in 1942 as a draftsman, later becoming a project engineer. He was promoted to assistant plant engineer in 1953. Before coming to Hooker, he was an instructor in the engineering college at Syracuse University and then became director of the science department at Livingston Manor, New York, High School from 1936 to 1942.

Optimum Use of Metal

FOUR MANUFACTURING processes previously restricted to military goods manufacture now are revealed in detail by A. O. Smith Corp., in a 26-page brochure on the optimum use of metal in production.

The processes center around unusual methods of precision forging and forming, contour rolling, flash and fusion welding and the proven "build-up" concept of assembling complete structures from accurately fabricated sub-assemblies.

Ultimate goal of this system is the virtual elimination of all machining or metal removal which cuts down expensive machine tools and costly man-hours spent in "making chips."

Although the booklet tells a story particularly vital to the aircraft manufacturing industry, these processes can be of value to many industries which have to make best possible use of metal.

This booklet, entitled "Engineering Designs for Optimum Structures," was produced by the Aeronautical Division and copies can be obtained by writing to F. A. Gruetjen, Director of Aeronautical Development, A. O. Smith Corp., Milwaukee 1, Wisconsin.

Plant Engineer Embree

Robert A. Embree was recently appointed process and plant engineer of the motor-generator division of Chandeysson Electric Co., St. Louis, Missouri.

In his new capacity, Mr. Embree will have charge of all manufacturing methods, processes, equipment and facilities.

Western Metal Exposition

"THE NEW IN metals and metal working" will be the theme of the Ninth Western Metal Exposition and Congress, which will be held at the Pan-Pacific Auditorium, Los Angeles, from March 28 through April 1.

Sessions will be presented by several technical societies in the Los Angeles Ambassador Hotel and the exhibits will be displayed at the Pan Pacific Auditorium. Some of the sessions will be devoted to: titanium, powder metals, high-strength steels, die materials and new forming methods for sheet metals, machining and tool materials and metals used in the petroleum industry.

Request for additional information on this show should be directed to Jack Stratton, Western Metal Exposition and Congress, American Society for Metals, 215 S. Clark Dr., Beverly Hills, Cal.

Barry Corp. Promotes Wrigley

Harold Wrigley was recently appointed works manager of the Barry Corporation, Watertown, Massachusetts, manufacturers of shock isolation equipment.

In his new position, he will assume responsibility for manufacturing, stock room, receiving, traffic, purchasing, production, production control and inventory control.

Mr. Wrigley is well equipped for his new duties, having joined the Barry Corp. in 1951, where he acted as plant superintendent. Prior to joining the company, he was district chief inspector of Stone and Webster Engineering Corp., Detroit branch, Michigan, and superintendent of the Worthington Corp., Holyoke, Massachusetts.

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where you want it
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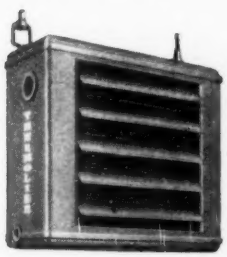
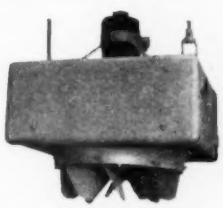
whatever the fuel you use

GRINNELL UNIT HEATERS

Horizontal Gas-Fired Model for natural, manufactured, mixed and LP Gases.



Horizontal Model for steam and hot water systems.



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Gas-Fired Unit Heater

Available in 7 sizes — ranging from 25,000 to 200,000 Btu per hour input

Grinnell Gas-Fired Unit Heaters are easy to install, simple to operate and maintain. Efficient performance is assured — with any type of gas — by modern design of burners and heat exchanger, proper motor and fan unit. Automatic safety pilot operates to shut off main gas supply if pilot goes out. Flashback and extinction noise prevented by the burners' raised port design and proper port size for the gas used. American Gas Association approved.

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4 models . . . 18 sizes — from 35,600 to 275,300 total heat delivered, Btu per hour

Three basic models—horizontal, vertical and a special horizontal Textile model. (Adjustable velocity nozzle also available for use on horizontal models.) All models have plain thermostatic trap, the simplest and least expensive kind of a trap, made practical because of unit's exclusive internal cooling leg; maximum capacity provided and destructive water hammer eliminated by built-in pitch of tubes. Many other important features.

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64. The Chemstrand Corp., Decatur, Ala.
65. Minnesota Mining & Mfg. Co., Hastings, Minn.
66. The General Tire & Rubber Co., Baytown, Tex.
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68. California Refining Div. of The California Oil Co., Perth Amboy, N.J.
69. The Chemstrand Corp., Pensacola, Fla.
70. Shell Chemical Corp., Ventura, Cal.
71. Consolidated Edison Co., Astoria, N.Y.
72. B. F. Goodrich Chemical Co., Calvert City, Ky.
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IN THIS MODERN, low cost system, one truck-mounted Dempster-Dumpster picks up, hauls and empties, or sets down intact, one loaded detachable Dempster-Dumpster Container after another, regardless of design or size, handling bulk materials of practically every description.

The new Dempster-Dumpster Type DTLF offers several desirable features along with all the economies provided by the Type LFW. These features include: (1) Improved load distribution with container carried in more forward position between wheel centers. (2) Extreme high dumping in cases where it is desired. (3) Vertical pick up of loaded container. (4) Container, loaded or empty, is always in horizontal plane in carrying position. Automatic locking device for positive rigidness of container while in carrying position is, of course, provided.

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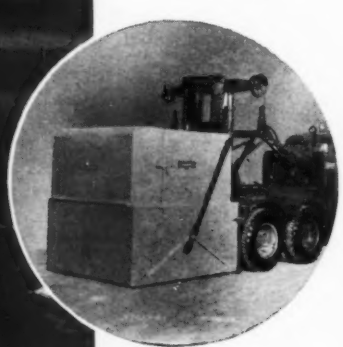
Containers range from 2 to 21 cu. yds. capacity for use with recommended type Dempster-Dumpsters. Each container is designed to suit the materials to be handled—be they trash, rubbish, liquids, dust, bulky, light or heavy. Many leading plants, in almost every type of industry, have found it indispensable after installation. Its proved savings alone justifies an investigation of its potential value in your plant now. Write to us today for complete information. Manufactured and sold exclusively by Dempster Brothers, Inc.

The photo at left illustrates the amazing ability of the Type DTLF Dempster-Dumpster for high dumping. The three photos below show the Pick Up, Haul and Dumping action, hydraulically controlled from cab.



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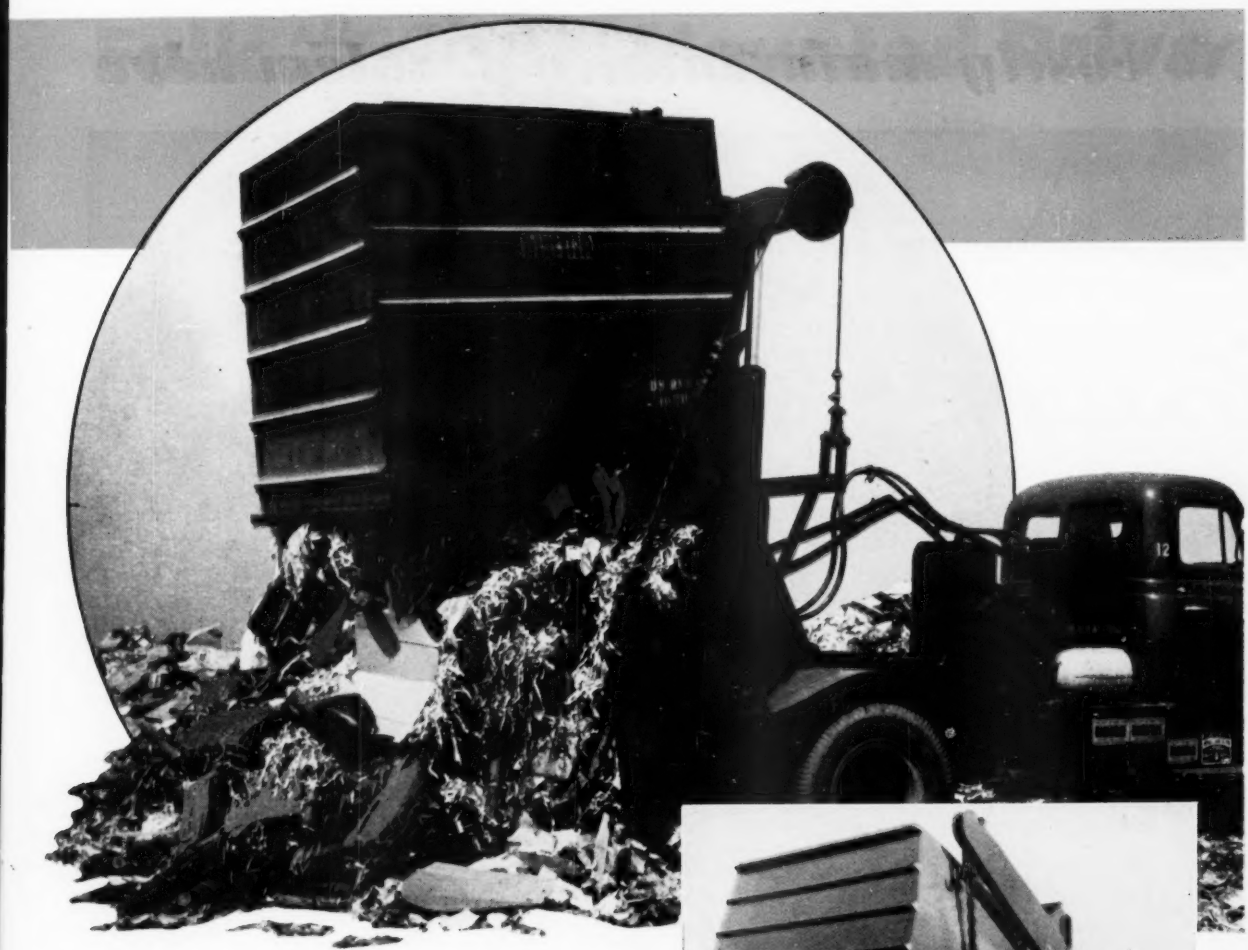
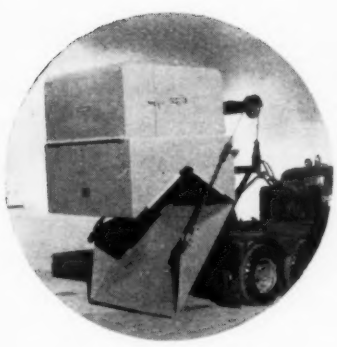


Photo above shows the new Dempster-Dumpster Type DTLF dumping 8 cu. yds. of rubbish. At right you see the Type LFW with load in carrying position. Dempster-Dumpsters are available in capacities capable of handling up to 38,000 pound payloads.



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Corrugated Transite has been featured in this contemporary plant design. The shadow lines of the corrugations provides decorative interest for the large wall areas.

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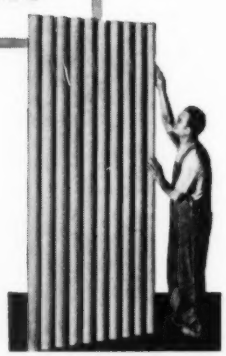
For maintenance-free exterior walls and roofs, plus protection from fire, rot and weather

YOU SAVE MONEY on construction and maintenance when you build with Johns-Manville Corrugated Transite®. Corrugated Transite comes in large sheets that require a minimum of framing . . . permits fast economical construction of maintenance-free industrial, commercial, institutional and agricultural buildings.

Made of asbestos and cement, Corrugated Transite is practically indestructible. It never needs paint or special treatment to preserve it . . . it's fireproof, rotproof and weatherproof. Corrugated Transite is also used increasingly for smart interiors . . . the streamlined corrugations and attractive shadow lines that give it such unusual architectural appeal for exteriors offer unlimited interior design possibilities.

Investigate Johns-Manville Corrugated Asbestos Transite and learn how you can build quickly and easily . . . have an attractive, long-lasting, trouble-free structure regardless of size or purpose. For complete details write Johns-Manville, Box 158, Dept. PE, New York 16, New York. In Canada write 199 Bay St., Toronto, Ontario.

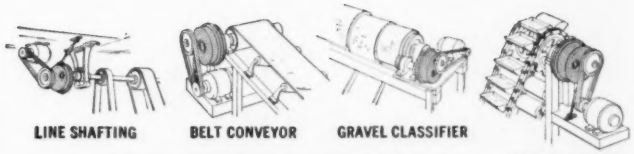


- Large sheets go up quickly
- Easy to fasten to steel
- Easy to nail to wood
- Easy to saw
- Easy to drill

JOHNS MANVILLE JM PRODUCTS **Johns-Manville**

For more facts circle 508 on Reply Card

Falk ALL-STEEL Shaft Mounted Drives

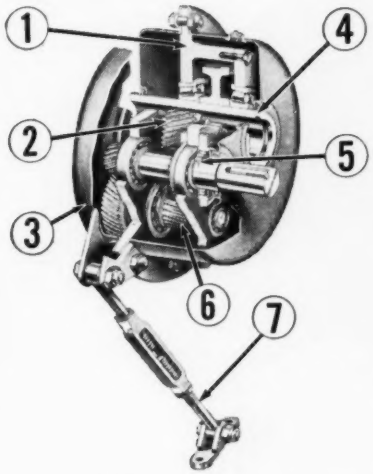


APPLICATIONS UNLIMITED

The range of applications to which the all-steel Falk Shaft Mounted Drive is ideally suited is so wide that complete listing is impracticable. The sketches above are included only to indicate a few typical installations where considerable speed reduction in limited space is an important advantage.

SIX SIZES

- 1/2 to 30 hp
- Single or double reduction
- Wide output speed range—420 to 10 rpm



These versatile, NEW speed-reducing units

save space, power, material and time

Here is the economical solution to the countless application problems requiring efficient speed reduction in limited space! The new Falk all-steel Shaft Mounted Drive—a modification of the universally-accepted Falk Motoreducer design—embodies many exclusive structural and functional features which add up to better service, longer life and substantial savings.

This rugged, compact drive mounts directly on the driven shaft—a distinct saving in floor space. Its precision Falk helical gearing gives highest mechanical efficiency, with a resultant power saving. No adjustable motor bases or slide rails are required. Installation is simple and rapid—output speeds can be quickly changed; thus time is saved...Write to Department 247 for engineering bulletin, including selection and dimension details.

FALK "In-Built" Factors... that give maximum efficiency, convenience and dependability

1 **All-steel Frame,** with more than double the rigidity of iron, supports all rotating elements.

2 **Precision Helical Gears,** designed and machined by Falk, rated to AGMA standards.

3 **Pressed Steel Housings,** whose sole function is to keep oil in, dirt out; easily removed for gear inspection without dismounting unit.

4 **Through Hollow Shaft** with counter bore provides for easiest installation or removal from driven machine shaft extensions.

5 **Backstop** can be furnished with the unit or added later for positive prevention of reverse rotation.

6 **Positive Lubrication,** continuous direct dip of revolving elements at all speeds.

7 **Tie Rod** and turnbuckle serve as anchor and facilitate V-belt or chain adjustment.

THE FALK CORPORATION, Milwaukee 8, Wisconsin

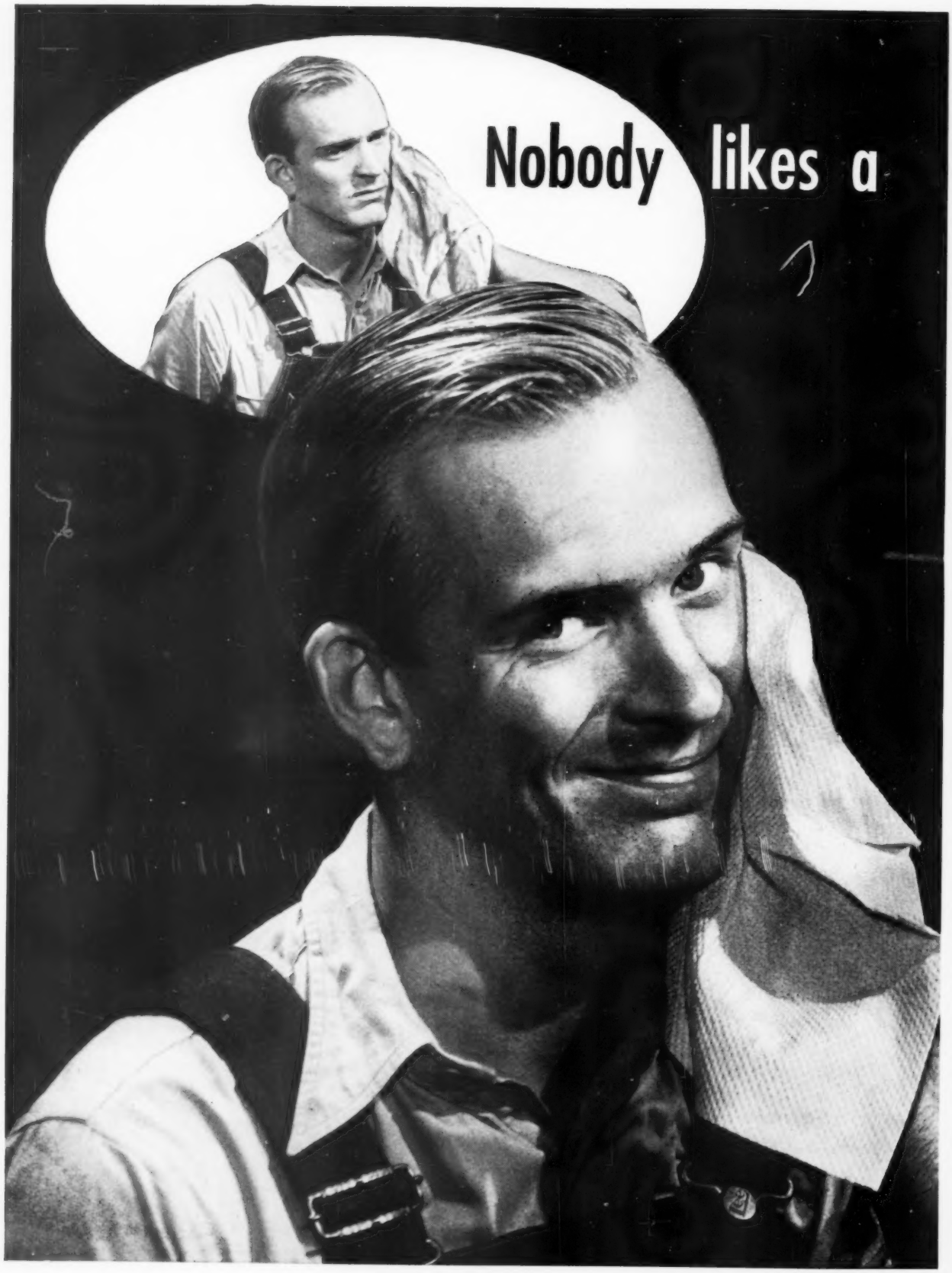
MANUFACTURERS OF

- Motoreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
- High Speed Drives
- Special Gear Drives
- Single Helical Gears
- Herringbone Gears
- Marine Drives
- Steel Castings
- Weldments
- Contract Machining

FALK

...a good name in industry

For more facts circle 509 on Reply Card


Nobody likes a

dirty wiper

...Another good reason for switching to **Scott Wipers!**

Because a clean, fresh one is always available—Scott Wipers provide a constant source of clean chip-free wiping material.

Scott Wipers are sanitary and disposable. They greatly reduce the costly scratches and digs in finished work caused by chips lodged in wiping materials. They end the laundering problem and simplify distribution and control.

Scott Industrial Wipers are two-ply and tough yet soft and absorbent. Compare them with whatever wiping material you're using now —for cost, for convenience, for performance.

The Scott representative or distributor in your area will be glad to help you set up a production line demonstration in your plant. Call him or mail this coupon today.

Scott Paper Company, Dept. PE-3, Chester, Pa.
Please send me full information on Scott Industrial Wipers.

Name_____

Position_____

Company_____

Address_____

City_____ State_____

For more facts circle 510 on Reply Card

this simple idea cuts V-Belt costs

— as a V-Belt bends, feel its sides change shape!

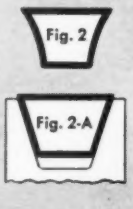
Pick up *any* V-Belt that has straight sides (Fig. 1) and bend it as if it were going around a pulley. At the same time, *grip its sides* with your fingers! You will feel the sides *bulge out* as in Fig. 1-A. Clearly, the bulging belt is forced to press *unevenly* against the V-pulley—and this concentrates wear at the points shown by arrows (Fig. 1-A).

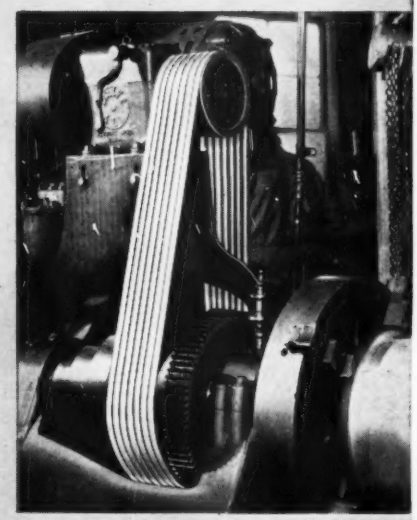
Now bend the belt with CONCAVE SIDES

(U.S. PAT. 1813698)

. . . the GATES VULCO ROPE (Fig. 2)

Instead of *bulging*, the precisely engineered CONCAVE SIDES merely *fill out* and become perfectly straight. This belt, when bent, *precisely fits* its sheave groove (Fig. 2-A). The sides press *evenly* against the V-pulley. Therefore, wear is distributed *uniformly* across the full width of the Gates Vulco Rope—and this means longer belt life and *lower belt costs* for you!





Typical Gates Vulco Rope Drive—the Gates V-belts are built with Concave Sides to insure longer belt wear.

When you buy V-belts, be sure to get the V-belt with the CONCAVE SIDES — the Gates Vulco Rope!

Gates

VULCO ROPE DRIVES

THE GATES RUBBER COMPANY
DENVER, U.S.A.

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

For more facts circle 511 on Reply Card

Here's a one-punch knockout for acid vapor corrosion

THIS blast furnace blending room roof gets a steady diet of sulphurous acid, high moisture and coke fumes. It's enough to make any metal cry Uncle. But one economical, easy-to-apply application of *Pitt Chem* Tar Base Coating licked this rugged corrosion problem.

No matter how large, small, simple or complex *your* corrosion problem is, your best chance of solving it is with *Pitt Chem* Coatings. They are formulated to fully utilize the excellent resistance of coal tar pitch to moisture, mineral acids, alkalis and weather. No other material does such a complete job of protection at so little cost.

If you have a corrosion problem that's stumping you, why not have your engineers get together with ours. It's a business-like move to protect your investment in plant and equipment. A call is all that's needed. Or see our catalog in Sweet's Plant Engineering File.

Write For FREE Corrosion Control Booklet

Tells where tar base coatings can save you money in your plant . . . what grades to use . . . how to apply them.

W&D 4967

PROTECTIVE COATINGS DIVISION

PITTSBURGH COKE & CHEMICAL CO.

Grant Building • Pittsburgh [illegible], Pa.

COAL CHEMICALS • AGRICULTURAL CHEMICALS • FINE CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

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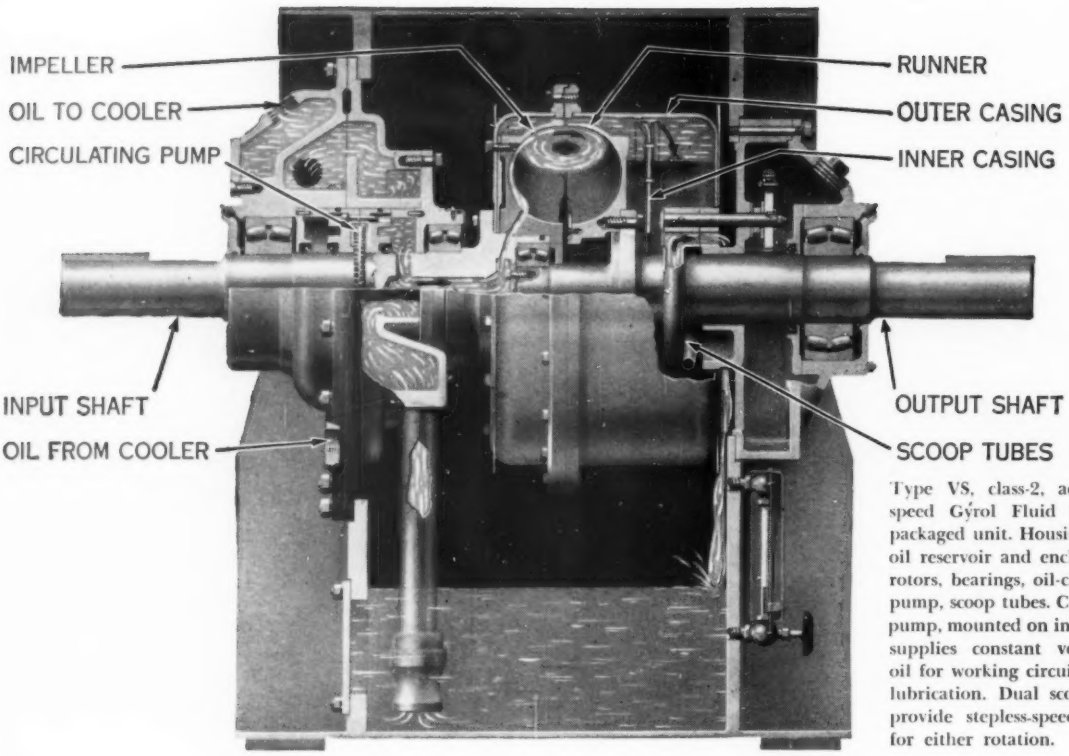
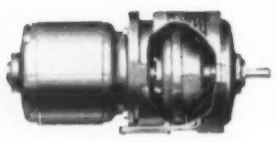
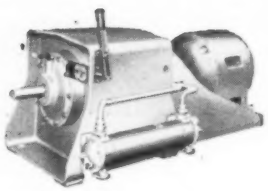


Type VS, class-2, adjustable-speed Gýrol Fluid Drive — a packaged unit. Housing acts as oil reservoir and enclosure for rotors, bearings, oil-circulating pump, scoop tubes. Circulating pump, mounted on input shaft, supplies constant volume of oil for working circuit and for lubrication. Dual scoop tubes provide stepless-speed control for either rotation.

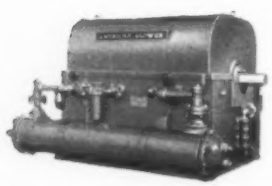
Choose the exact fluid drive you need!



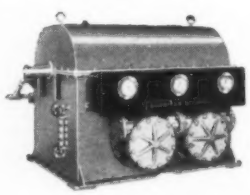
Type TM Gyrol Fluid Drive: motor, traction-type drive in a single unit; 1 to 20 hp; Bulletin 8519. Type T: traction-type less motor; ½ to 200 hp; Bulletin 7419.



Type VS, class-2, adjustable-speed Gýrol Fluid Drive. Speed range: 5 to 1. Six sizes, 7½ through 800 hp; speeds up to 1,800 rpm. Request Bulletins 9419 and 9519.



Type VS, class-4 Gýrol Fluid Drive — an adjustable-speed drive for fans, compressors and pumps, etc. 100 to 2,500 hp; speeds up to 1,800 rpm. Ask for Bulletin 9319.



Type VS, class-6 Gyrol Fluid Drive — adjustable speed drive for boiler-feed pumps, compressors, other high-speed applications. 400-12,000 hp; to 3,600 rpm. Bulletin 8019.

American Blower offers you a complete line of Gýrol Fluid Drives — including the new type VS, class-2, adjustable-speed model

Application possibilities are unlimited with American Blower's Gýrol Fluid Drive line!

For example, the new type VS, class-2, adjustable-speed Gýrol Fluid Drive can be reversed while in motion — at any adjustable operating speed — by merely changing the direction of rotation of the motor! And you can use this compact, self-contained unit in a variety of arrangements of the driving motor.

The standard Gýrol Fluid Drive line includes constant-speed and adjustable-speed units — up to 12,000 hp, and speeds to 3,600 rpm. You'll find there's a Gýrol Fluid Drive to fit practically any application.

For fact-packed bulletins and complete engineering data, get in touch with your nearest American Blower or Canadian Sirocco Branch Office; or write us direct. Do it, today!

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American Radiator & Standard Sanitary Corporation

AMERICAN BLOWER

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS

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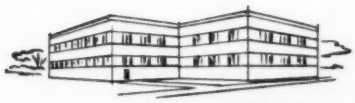
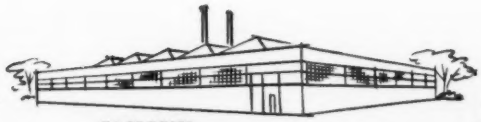


APARTMENTS



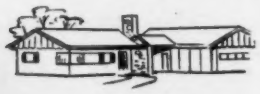
FACTORIES

RESTAURANTS

MOTELS

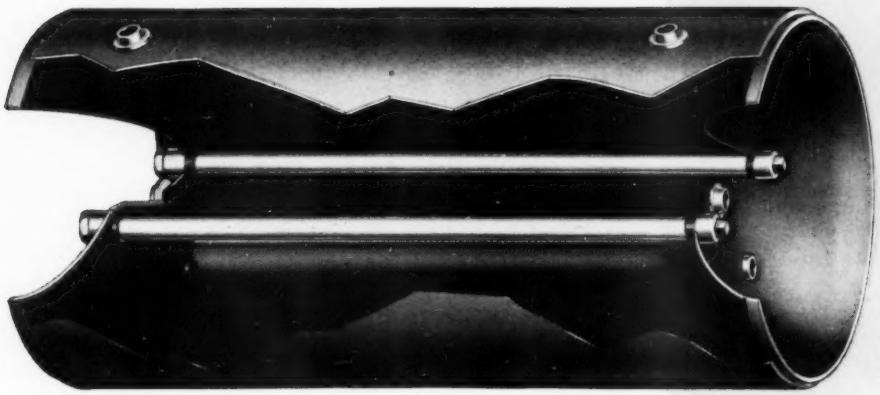
new!

SCHOOLS



HOMES

LAUNDRIES



Cut-a-way view of concave type tank suitable for horizontal or vertical mounting.

● Here is a *glass-lined*, large volume water storage tank to meet your demands for the clean, rust-free storage of cold and hot water for your commercial or industrial jobs. Where rust and corrosion are annoying problems and where long tank life is desired these *new* glass-lined water tanks are the answer . . . and at reasonable cost.

The inside of this new tank, especially designed for the storage of water, is completely coated with special A. O. Smith ceramic glass, permanently fused to the steel. Stored water will stay as pure and clean as your water supply, and rust free, too, because the mirror-smooth, glass-surfaced steel tank can't rust or corrode under any water conditions. Ranging in size from 100 to 1,000 gallons, or larger on special orders . . . designed for horizontal or vertical mounting in the smaller sizes for installation flexibility . . . available for use in gas-fired Burkay hot water systems . . . or fitted with coils for steam systems . . . you have a proved line of water storage tanks to choose from.

See your nearest A. O. Smith distributor for full details about this quality line of Permaglas water storage tanks.

Permaglas®

LARGE VOLUME WATER STORAGE TANK

for restaurants, plants, motels, laundries, apartments, homes, schools — or any place where water rusts or corrodes tanks.

Through research ...*a better way*

A.O.Smith
CORPORATION

PERMAGLAS DIVISION • KANKAKEE, ILLINOIS

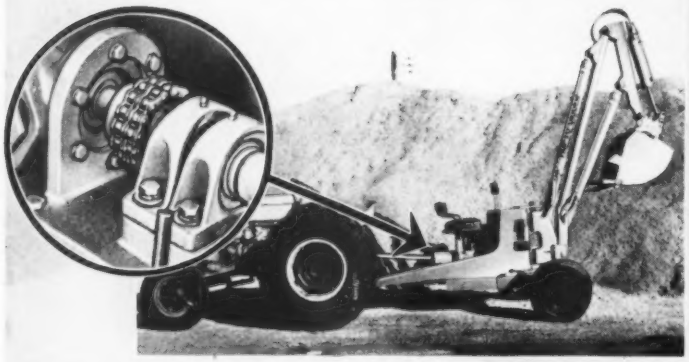
write Write for the new Permaglas Large Volume Water Storage Tank Specification Sheet . . .

TO: A. O. Smith Corporation, Kankakee, Illinois, PE, 12-54.
Gentlemen: Please send me the above mentioned literature.

Name.....Title.....
Company.....
Address.....
City.....Zone....State.....

For more facts circle 514 on Reply Card

SOLVE YOUR SHAFT CONNECTION PROBLEMS WITH DIAMOND FLEXIBLE COUPLINGS!



POWER TAKE-OFF

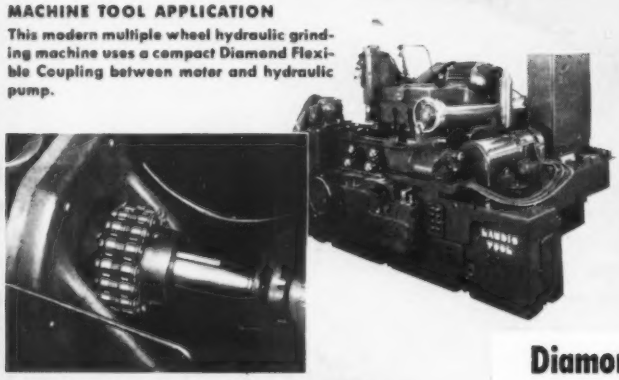
Diamond Flexible Coupling connects drive shaft from tractor to hydraulic pump on trailer type back-hoe.

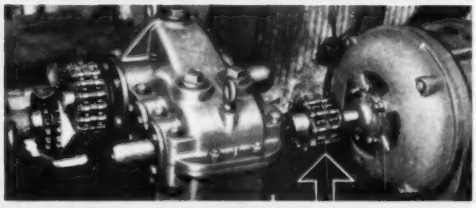
HYDRAULIC PUMP DRIVE

Diamond Coupling provides quick, easy installation. Driving and driven shafts need not be of the same diameter.

MACHINE TOOL APPLICATION

This modern multiple wheel hydraulic grinding machine uses a compact Diamond Flexible Coupling between motor and hydraulic pump.



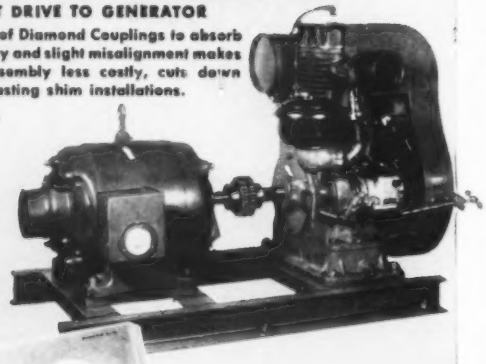


ELECTRIC MOTOR TO SPEED REDUCER

High speed shaft connections require little space with compact Diamond Couplings. Installation is quick and easy.

DIRECT DRIVE TO GENERATOR

Ability of Diamond Couplings to absorb end-play and slight misalignment makes unit assembly less costly, cuts down time-wasting shim installations.



Bulletin No. 19 contains complete data for the selection of Diamond Flexible Couplings from fractional to over 600 horsepower. Your copy will be sent upon request.

Diamond Couplings Absorb Shaft End-Play and Moderate Misalignment

Diamond Couplings consist of only three major parts: two hardened steel sprockets and a length of two-strand Diamond Roller Chain. Moderate angular and parallel misalignment and shaft end-float is absorbed in the clearances between the chain and sprocket teeth. The load is carried at the greatest possible radius and spread over the entire chain length so that the strength of the chain greatly exceeds the requirements.

Ease and speed of installation, long-life dependable service and minimum maintenance are outstanding advantages of Diamond Flexible Couplings. Diamond Engineers will be happy to assist you with your shaft connection problems.

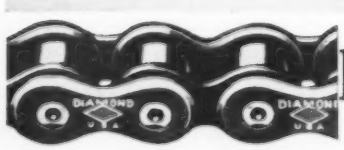
DIAMOND CHAIN COMPANY, Inc.

Where High Quality is Traditional

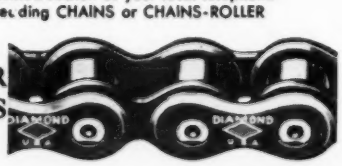
Dept. 614, 402 Kentucky Avenue, Indianapolis 7, Indiana

Offices and Distributors in All Principal Cities

Please refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER



DIAMOND ROLLER CHAINS



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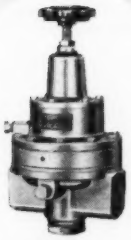
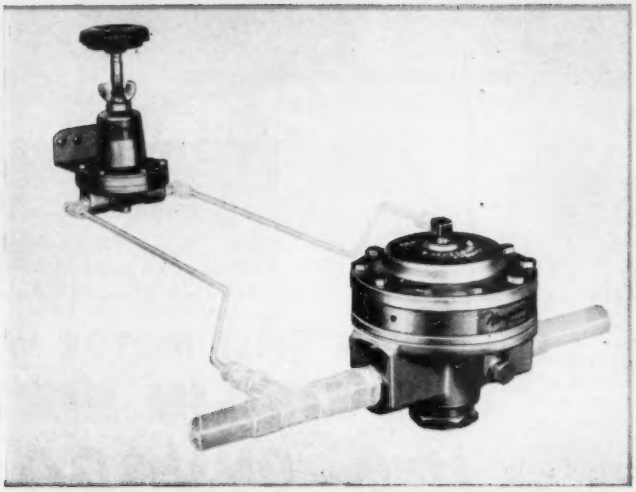


Norgren
Pilot-Controlled
Regulator
Integral
Type

Norgren

PILOT-CONTROLLED PRESSURE REGULATORS

give you greatest performance for cost and size



Norgren
Pilot-Controlled
Regulator,
Remote Control Type

MORE CAPACITY — MORE ACCURACY

Norgren Pilot-Controlled Pressure Regulators provide extremely accurate, automatic pressure regulation, with capacities up to 250 cfm (more if needed). Performance data prove that large fluctuation in flow and primary pressure have negligible effect on regulated air pressure. Examples: the secondary pressure remains constant at 30 psi. with an 80 psi. primary pressure and flow varying from 0 to 200 cfm. Secondary pressure remains constant at 30 psi. with flow of 60 cfm. with primary pressure varying from 50 to 120 psi.

Using accurately controlled air pressure for your pneumatic equipment is essential if you want a higher quality of machine output at a faster rate of production and at lower unit costs. You'll find, too, that important savings in equipment maintenance and in compressed air costs often result.

MAXIMUM FLEXIBILITY

Norgren Pilot-Controlled Air Regulators are available in both remote control and integral types; ½", ¾", 1" sizes; for the accurate reduction of line pressures as high as 400 psi. to working pressures of 2 to 120 psi; capacities up to 250 cfm. (more if needed).

WRITE FOR COMPLETE DATA

C. A. Norgren CO.
3443 So. Elati, Englewood, Colo.

PIONEER AND LEADER IN OIL-FOG LUBRICATION FOR 26 YEARS

VALVES • FILTERS • LUBRICATORS • REGULATORS • HOSE ASSEMBLIES

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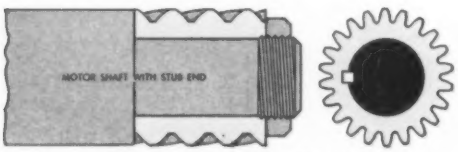
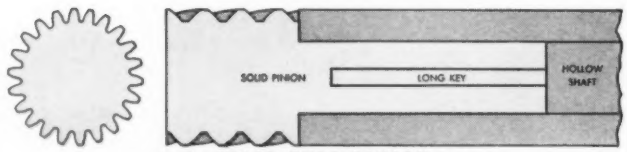
In your opinion, which pinion?

. . . for longest life in a gearmotor



ORDINARY SHELL TYPE PINION



U. S. SOLID TYPE PINION

In an internally geared motor the pinion on the motor shaft is the vital link between motor and gearing. It's the fastest, but smallest gear, so it must be extra strong, free from vibration and forever tight. Now compare the U. S. Syncrogear motor pinion with the ordinary type. Note the extra large section area of the U. S. design. It has a long solid shank that anchors into the motor's hollow shaft, whereas the ordinary shell type has a small section area, short keyed.

Obviously the U. S. design is most substantial, longer lasting, more resistant to deflection and can carry high speed loads far more safely than common designs. All the gears are deep-hardened and shaved to exact tolerances in the U. S. plants.

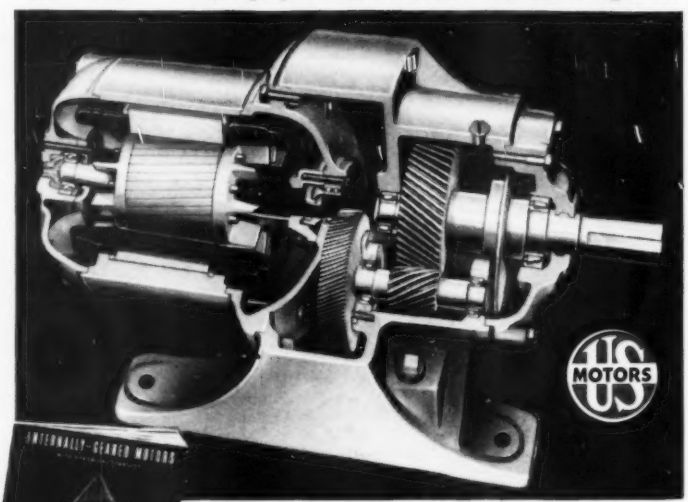
Added life lengthening features

The rugged pyramidal case supports the motor and gear train and all castings are normalized to insure permanent alignment and to prevent distortion. The motor windings are asbestos-protected to avoid carbonization and guard against burnouts. All moving parts are completely enclosed for weather and dust protection and confined within the least cubical dimensions on a single mounting. ¼ to 30 h.p.; 10 to 10,000 r.p.m.

THE ONLY MOTOR WITH A

BUILT-IN PINION

U. S. SYNCROGEAR



FREE **16-PAGE DESCRIPTIVE BOOKLET GIVES ALL THE FACTS**

Interesting multi-colored Booklet presents engineering facts you should know about geared motors, and illustrates the various U. S. Syncrogear types. Mail the Coupon for a copy. No obligation.

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BULLETINS just released and of immediate plant interest

CONSTRUCTION AND MAINTENANCE

101 Glass Blocks for Toplights — This 8-pp catalog describes glass blocks of special optical design for use in skylights. It is offered as a reference manual and provides information on physical performance, technical data on light transmission, insulation values, installation detail drawings and specifications. Pittsburgh Corning Corp.

102 Concrete Roof Tile—Zonatile, a short-span concrete roof tile is described in Form ZT-1. Gives physical properties and specifications on this reinforced lightweight vermiculite tile; illustrates its use in sub-purlin and rail sections, standard structural members. Stresses efficiency and economy of the material in combining insulating qualities with structural strength. Zonolite Co.

103 Industrial Doors—Vertical lift, turnover doors, and crane doors are described as to operation and application in this 8-pp illustrated bulletin. Full specifications are provided, also a guide to door type selection. International Steel Co.

104 Hollow Metal Doors—Information on hollow metal doors, both swing and slide, is presented in this 20-pp catalog. Contains data on seven styles—entrance, flush-type, panel slide, Underwriters', and others. This wide range is presented in standardized types and sizes adaptable to many kinds of buildings. Construction features, advantages, uses, hardware and equipment, installation instructions, specifications, and charts of types and sizes are included, also photos, sketches, and diagrams. Detroit Steel Products Co.

105 Doors, Operators — This bulletin describes a line of doors and electric operators and controls for commercial and industrial uses. Details of construction and operation are given, as well as specifications and information on various materials of construction. Overhead Door Corp.

106 Hard Mastic Flooring—Facts on Permaflex, a mineral and chemical floor compound, are given in this illustrated folder. Lists advantages, and tells performance characteristics of the floor, where it should be used and how it is used. Step-by-step photos show installation procedure, and cost figures are given on a representative installation. Permaflex Products Co.

107 Steel Flooring — This folder describes company's lightweight, low-cost gratings of expanded steel plate. Tables of sizes, weights and dimensions, are included, as well as deflection tables giving load in lbs for various spans. Descriptions, illustrations, and application photos of the different meshes are also provided. Penn Metal Co., Inc.

108 Storage Shelving — Rapid erection, strength and other advantages of manufacturer's storage shelving are stressed in this illustrated bulletin. Shows component parts, open types, closed types and some of the many combinations of dividers, bins, doors available. Also presents tool inserts, other shop equipment. DeLuxe Metal Furniture Co.

109 For Floor Repairs—This manufacturer's circular describes Duropax instant floor patch, which supports traffic immediately after application. Product features listed include stable, freeze-proof storage qualities, and non-shrinking, age-strengthening characteristics. Simple method of application is fully described. Tile-Tite Corp.

110 Got Floor Problems? — "Floors and Floor Problems" is a 24-pp brochure offering an authoritative discussion of floors. Illustrated by photos, drawings and diagrams, it explores various types of floors and their construction, factors entering into their deterioration, and the diagnosis and treatment of floors troubles. Among subjects treated in detail are reasons for deterioration of wood floors and of concrete floors, and the special problems of industrial floors. The Tremco Mfg. Co.

111 For Better Maintenance — This 28-pp booklet discusses size and complexity of today's maintenance problem, and the necessity of applying to it a sound engineering approach. Also presents a comprehensive program for planning and controlling plant maintenance. Discusses eight basic points that consitute a complete maintenance program: organization, personnel, facilities, methods, scheduling, controls, and policy. Anderson-Nichols & Co.

112 Why Surface Preparation—This bulletin points out importance of proper surface preparation in coating or painting applications, and discusses the possibility of coating failures due to adhesion loss, osmotic blistering and under-film corrosion when this preliminary cleaning operation is poorly executed. Shows photos of sandblast jobs and describes briefly various methods used to produce clean, roughened, keyed surfaces that assure good bond, lasting finish. Metalweld, Inc.

HEATING, VENTILATING AND AIR CONDITIONING

113 Unit Heaters—Illustrated Bulletin 15, 8-pp, is designed to give the plant engineer actual diagrams and instructions for making most unit heater installations. The majority of system applications are shown and a table of the most commonly used heat transmission coefficients is also included. A companion publication, Bulletin 12, discusses care and maintenance of steam and hot water unit heaters. Includes installation and maintenance details, and other information on various heaters. Industrial Unit Heater Association.

114 Heating, Ventilating Equipment — Revised Bulletin PB-290, 36 pp, describes and illustrates a line of heating, air conditioning, ventilating and heat transfer equipment. All new products, as well as existing ones with improvements are covered by text and illustration—although full information is not given on each product. Bulletin shows new large size CenTraVacs, cold generators, duplex compressors, Climate Changers, Delta-Flo fin coils and other equipment. The Trane Co.

115 Roof Ventilators—Power and gravity roof ventilators are shown in this 8-pp catalog. Contains technical data and capacity ratings with photo illustrations covering company's line of propeller fan, centrifugal, stationary, rotary and ridge roof ventilators and accessories. Penn Ventilator Co.

116 Ventilating Equipment—A 36-pp guide to selection of propeller fan type ventilating equipment, Catalog 151 includes specifications and installation data on company's propeller fans in portable, tubeaxial, centrifugal, roof ventilator and other types. Detailed illustrations of construction features accent design and performance factors. Case study photos show installations. Ilg Electric Ventilating Co.

117 Climate Changer—Bulletin DS-303 describes company's new Climate Changer line and explains how it is possible to include or omit any combination of the six phases of air conditioning with this unit. Discusses construction and design features and offers information on selection of climate changers. Engineering specifications are included, and numerous charts and diagrams illustrate pertinent facts on various models. The Trane Co.

PIPING, VALVES, TRAPS AND ACCESSORIES

118 Stainless Piping—Of interest to plant engineers associated with problems involving stainless piping, Bulletin TB 356 outlines methods of bending and joining stainless pipe and discusses light wall versus heavy wall type. Also included are a table of dimensions and weights of various stainless pipe size schedules and condensed technical data on mechanical and physical properties of the more popular stainless steels used for piping. Tubular Products Div., The Babcock & Wilcox Co.

119 Plastic Pipe, Valves—This 6-pp bulletin describes tough, corrosion-resistant Dur-Ace plastic pipe fittings and valves. Gives properties of Dur-Ace and includes table showing resistance to more than a hundred chemicals. Standard sizes and pressures of pipe are given, also sizes, weights, prices on pipe and fittings, diaphragm valves. American Hard Rubber Co.

120 Automatic Regulators—Illustrated information on 12 basic control valve types used in chemical process industries, power generating facilities, and in liquid or gas pressure control applications requiring precise instrumentation by automatic regulators is presented in this bulletin. Reducing valves, pump governors, relief valves, temperature regulators, float valves, damper regulators, combustion control valves, and boiler feedwater regulators are among the items treated. Atlas Valve Co.

121 Solenoid Valves — Bulletin 8210A features company's line of two way solenoid valves for controlling the flow of air, gas, water, light oil, and other noncorrosive fluids. Cutaway photos and diagrams illustrate design, construction, and application details. Includes flow charts and lists maximum pressures. Automatic Switch Co.

122 Needle and Globe Valve—This pamphlet describes company's line of bellows seal needle and globe valves. Includes information on service, service range, sizes available, connections, materials, and special features. Diagrams and charts on dimensions complete the description. Associated Valve & Engineering Co.

123 Air Trap Selection—Bulletin 2022 describes methods of selecting and installing company's air traps for automatic drainage of water from compressed air inter-coolers, after-coolers, receivers, separators and drip points. Shows how removing water from compressed air systems prevents it from washing lubricant out of air tools and prevents moisture contamination at point of use. Includes detail drawings, physical data and list prices of ball float, inverted bucket and snap-action air traps. Armstrong Machine Works.

124 Expansion Joints, Bellows—Engineering and application data on typical and special expansion joints in types for pressures to 900 psi are provided in 40-pp Catalog 51, now available to plant engineers. Also provides information on anchor bases and pipe guides. One section of this well-illustrated booklet is devoted to bellows for industrial and other uses. Special advantages of Sola-Flex construction are stressed. Solar Aircraft Co.

125 On Wrought Iron Pipe—Provided in this technical data sheet are sizes and dimensions for butt-weld and lap-weld pipe; also weights mill test pressure. Describes wrought iron's composition, gives an easy method of identification, and reviews official standards to which wrought iron conforms. A. M. Byers Co.

126 Swivel Pipe Couplings—All-Flex ball bearing swivel pipe coupling for low pressure service are presented in illustrated Catalog 234L. Gives ordering information on eight styles, includes price list. H & N Mfg. Corp.

You'll find two postage-free Reader Service Cards on pages 145-146. Use them for ordering these bulletins — just circle the item numbers of those you want. You may also use the cards for requesting advertised catalogs.

METALS AND ALLOYS

127 **Low Alloy Steels**—Sixteen-pp Bulletin A-61 describes a group of high-strength, low alloy steels giving their characteristics, corrosion resistance, information on forming and working, and design factors involved in their use. Applications in many fields are told, and economics of application explained. The International Nickel Co., Inc.

128 **Aluminum Products**—This 24-pp booklet contains information on company's aluminum products and services. Discusses characteristics of aluminum, methods of fabricating and finishing, and new alloy designations. Catalog includes data, tables and charts on alloy applications, mechanical and physical properties, extrusions, sheet, plate, and casting alloys. Kaiser Aluminum & Chemical Sales, Inc.

129 **Data on Die Casting**—This 28-pp illustrated booklet describes die casting process and its application and how it affects product design, machining requirements and surface finish. Basic steps are shown pictorially, and descriptions of dies and machines used to produce uniform parts of complex shape within close dimensional limits are included. Zinc, aluminum, magnesium and copper base die casting alloys are discussed, and a section on each outlines its advantages and limitations with regard to cost, dimensional accuracy, surface finish, strength and machinability. Specifications and photos to illustrate typical applications included. American Zinc Institute, Inc.

130 **Facts About Zirconium**—This 68-pp, pocket-sized booklet offers a concise compilation of information on history and production of zirconium. Mechanical and physical properties, chemical properties, facts about fabrication of zirconium such as melting, forging, rolling, welding, machinability are discussed. One chapter treats zirconium chemicals such as zirconium tetrachloride, dioxide, sulphate and Carbo-Cast-Aid. Appendix lists data on crystallographic features, atomic and nuclear properties. The Carborundum Metals Co., Inc.

131 **Impregnation of Castings**—How modern casting impregnation achieves complete sealing of porous castings is discussed in this 8-pp brochure, which illustrates graphically equipment used in batch immersion for the rapid treatment of large quantities of parts. Explains how impregnation reduces product rejects in both cast and metal powder parts, and gives data on applications to various metals. Tables give properties of impregnant, and list corrosives resisted. American Metaseal Mfg. Corp.

132 **Metal Forming Technique**—Advantages of the Cold-Flow technique in metal forming are discussed in 8-pp Form 600. Illustrated with photos of typical pieces in stock and microphotos illustrating grain flow, text stresses benefits offered through use of parts produced at lower cost through this high volume forming process. Camcar Screw & Mfg. Co.

Reader Service Cards for ordering bulletins are on pages 145-146. Be sure to include your name, job title, and company.

MECHANICAL POWER TRANSMISSION

137 **Roller Gear Drives**—Twenty-page Catalog 105 describes company's line of standard roller gear drives for high speed precision indexing of automatic production machinery. Complete tables on load ratings and dimensions for components only and housed units are given as well as data and instructions for calculation of loads, designing an installation and selection of a drive. Roller Gear Div. Ferguson Machine & Tool Co.

138 **Adjustable Speed Equipment**—The principle and use of dynamatic eddy-current adjustable speed equipment is presented in 16-pp Bulletin GB-2. Includes company's complete line—Adjusto-Spede drives, liquid and air cooled couplings and brakes, Dynaspede stationary field couplings, dynamometers, and special units. Outlines basic principles of eddy-current machinery, torque, heat and operating characteristics, cooling efficiency and control. Dynamatic Div., Eaton Mfg. Co.

139 **Variable Speed Drives**—Illustrated Bulletin 497 introduces a single wide-range belt variable speed drive. Shows how to design and select drives for 1- to 20-hp motors. This drive is described as extremely simple, yet covering a wide range of horsepowers with ratios up to 3 to 1. T. B. Wood's Sons Co.

140 **Porous Bronze Bearings**—More than 600 of the most widely used sizes (including standard sizes) of oil-retaining porous bronze bearings are listed by size in company's 20-pp Stock List 4. Based on the most popular stock sizes produced by the company, this list has been prepared to save the user time by eliminating sizes infrequently used. In addition to listing sizes of flange, sleeve and thrust bearings, together with cored and solid bar stock, it provides condensed information on application, installation, lubrication and machining. Bound Brook Oil-less Bearing Co.

141 **Moulded Fabric Bearings**—This 32-pp brochure illustrates applications and describes properties of moulded fabric bearings, wear plates and other parts. Shows bearings made for grease or oil lubricated, water lubricated, unlubricated and acid resistant services—journal sizes to 48 in. diam and larger. Also illustrates a great variety of moulded asbestos brake blocks, and other shapes. Gatke Corp.

ELECTRICAL EQUIPMENT

144 **Circuit Breakers and Switches**—Component Parts Catalog GEC-1025, 100-pp, is designed for manufacturers who incorporate electrical components into their products for resale. Contains information on circuit breakers, disconnect switches, open knife switches and component parts used in switchboards and panelboards. Over 2500 catalog numbers are listed, and description, list prices and dimensional outline drawings on the majority of products are included. General Electric Co.

145 **Variable-Ratio Transformer**—This 6-pp brochure describes company's Vernistat, a precision variable-ratio transformer. Explains construction and operation, and includes performance curves, application schematics in computer and servo systems, specifications of the 60 and 400 cps types, and step-by-step drawings illustrating the combination auto-transformer and potentiometer mode of operation. Vernistat Div., The Perkins-Elmer Corp.

146 **Power Transformers**—Bulletin 133 is a 16-pp engineering manual on power transformers. Provides detailed physical and electrical characteristics for liquid-filled single- and three-phase transformers from 750 through 10,000 kva. Includes sections on standard accessories, performance data, dimensions and weight, base dimensions, terminal arrangements and accessories. R. A. Uptegraff Mfg. Co.

147 **Speed Variators**—Bulletin GEA-6180 describes company's new B case speed variator power unit, a packaged, all electric adjustable voltage d-c drive operating from a-c power. The publication provides information on design and operating features, ratings and dimensions. General Electric Co.

148 **Commutator Motors**—Catalog E1-2A, 24-pp, describes company's line of commutator type motors. General physical specifications and construction details are included. Typical performance curves are plotted and numerous diagrams illustrate frame dimensions. Electric Indicator Co., Inc.

149 **Electrical Ceramics**—This pamphlet contains a large chart which lists electrical and mechanical properties of company's standard grades. Along with such properties as water absorption, density, tensile strength, dielectric constant, volume resistivity, and others, it recommends various general applications for all grades. General Ceramics Corp.

150 **Solenoid Contactors**—Bulletin SC-9, 8-pp, features a wide range of enclosed and sealed solenoid contactors with power ranges to 250 amp. Bulletin includes dimensional drawings and complete technical data. Lists military specification numbers, type numbers and specific approval information. Guardian Electric Mfg. Co.

151 **Polarized Relay**—Bulletin GEA-6212 features a high-speed relay "with a memory," describing functions and operation of company's hermetically-sealed, high-speed, polarized relay for electronic applications. Provides data on ratings, specifications and dimensions. General Electric Co.

152 **For Fluorescent Lighting**—Form 578, 8 pp, on fluorescent lighting fixtures and fittings, illustrates and describes company's four series of fluorescent and slimline units. Also presents applications. The Wiremold Co.

HEAT EXCHANGERS AND ACCESSORIES

153 **Heat Exchangers**—Bulletin HT-40, 8 pp, describes heat exchangers of the shell and tube type for the petroleum and chemical processing industries. Reviews building of the heat exchangers to ASME, API or other specifications and pictures units in various stages of fabrication. A feature of bulletin is a spread of engineering data and drawings of heat exchangers. The National Radiator Co.

154 **Tube Expanders**—Bulletin Y-38, 8-pp, describes company's line of tube expanders for condensers and heat exchangers, and gives full data on how to choose the proper expander for each rolling job. Contains chart listing prices and dimensions for the models available. Lagonda Div., Elliott Co.

(More Bulletins on page 145)

AMONG THIS MONTH'S NEW LITERATURE OF MERIT . . .

133 **Communication Systems**—Six basic manufacturing problems are illustrated and analyzed in this 16-pp booklet on planned plant communications systems. Importance of proper flow of current information for efficient production as well as management control is discussed. Schematic diagrams help clarify problems in inter-departmental communications. Communications systems for materials handling, production planning, quality control, and maintenance control are described. Solutions for dissemination of information are included with explanation of the use of company's Telescriber Systems. TelAutograph Corp.

134 **Why Small Fork Trucks?**—This 28-pp treatise shows how small and medium sized plants can compete with big business in materials handling efficiency. Space, time, and labor factors involved in small plant operation are analyzed and fundamental solutions are suggested. Booklet deals with specific requirements of small and medium sized plants for efficient handling of materials. Illustrations, figures and charts show features of design, construction and performance of small power fork trucks. Materials Handling Div., Market Forge Co.

135 **Good Operating Practices**—Some 101 good suggestions for maintaining plant buildings and equipment are presented in the 12-pp new edition of this booklet. Well illustrated, contains latest recommendations for getting the best service out of insulation, packings, refractory products, roofings and friction materials. Johns-Manville.

142 **Hot Water for Industry**—An excellent engineering data booklet, "Hot Water for Industrial Plants," is a compilation of literature covering use of water heaters for process needs, cafeterias, lavatories, wash fountains, laboratories. Discusses hot water requirements for these applications; describes and illustrates heaters, recovery systems, booster units applicable; provides installation suggestions and operating instructions. Available to qualified plant engineers, please state your title. A. O. Smith Corp.

143 **Conveyor Trolleys**—A new line of ball bearing trolleys for overhead conveyors is covered in 20-pp Book 2536. Contains specification data for the selection of new trolleys, or of replacements trolleys for existing installations. Describes many features resulting in low operating and maintenance cost, such as ball bearings with ground raceways, and machined and hardened treads. Includes application and maintenance information and a description of attachments commonly used. Twelve overhead trolley installations are illustrated. Link-Belt Co.

In electrical installations *where QUALITY counts* use CONDULETS*

Quality does count in practically every electrical conduit installation that you make. When you use CONDULETS you know that you are putting in electrical equipment of the highest quality, because CONDULETS have been doubly tested . . . in the factory and in the field.

Crouse-Hinds quality control assures a long-lasting product and field records prove it by the test that only time can give. Thousands of CONDULET installations are still in tip-top condition after twenty, thirty, or even more than forty years of dependable service.

The illustration at the right shows four of Crouse-Hinds' basic quality features that are common to all CONDULETS. The fifth, Wedge Nut Fasteners, is an exclusive Crouse-Hinds feature that has made Obround CONDULETS preferred by electricians everywhere.

1. **Taper tapping.** Condulet threads are taper tapped to match tapered conduit threading. Makes a rigid joint that will not loosen. This assures permanent ground continuity . . . important for safety.
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3. **Material.** Feraloy . . . a special alloy that is strong and tough, resists corrosion, and gives sharp, full threads
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5. **Wedge Nut cover fastener.** Clear cover opening . . . no projections. No loose parts . . . Wedge Nuts and screws self-retained. No screw holes to align.

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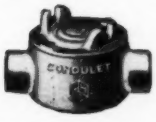
Type EVA Explosion-Proof Lighting Fixture

Type ARE Arktite Receptacle Equipment

Type FS Condulet With Pilot Lamp Receptacle, Switch and Plug Receptacle



Type GUAC Explosion-Proof Junction Condulet

Type VC Vaportight Industrial Lighting Fixture

Type FLF Explosion-Proof Manual Motor Starting Switch Condulet

Type EPC Explosion-Proof Motor Starter and Circuit Breaker Condulet

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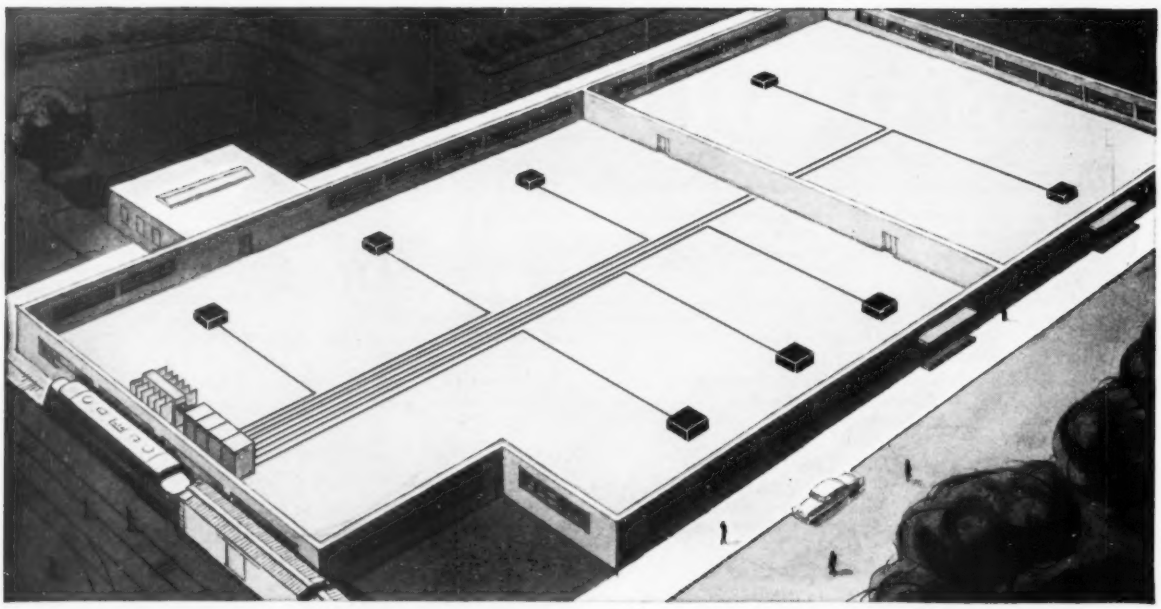
How G-E job-planned power systems can help maintain plant efficiency



WHEN INCREASING LOADS CALL FOR A NEW POWER DISTRIBUTION SYSTEM — G-E WIRE AND CABLE WILL GIVE IT THE VERSATILITY NEEDED FOR FUTURE EXPANSION.

The continuing development of new electrical equipment, processes, and materials handling methods doubles the use of electricity approximately every ten years — according to the findings of qualified authorities. This means that you may need a new or expanded distribution system to handle these greater loads efficiently — because the unstable voltages that result from overloads increase distribution and equipment maintenance costs, and result in outages, faulty operation of equipment, and interrupted production.

A General Electric job-planned cable system is designed and coordinated to maintain plant efficiency by accommodating growing and changing load requirements. And G-E cables will keep your installation costs to a minimum, too.

Here are some examples:

85 C Super Coronol* cable provides overload capacity

G-E Super Coronol cable's normal rating (85 C up to 15,000 volts) and its emergency rating (up to 115 C depending on voltage) give you reserve capacity for handling growing loads. This cable, used for lead-ins and cable feeders, can be buried directly in the ground or installed in conduit or ducts.

G-E interlocked armor cable system provides for changes in plant layout

G-E V-c interlocked armor cable primary or secondary feeder systems can be installed quickly, and can easily be expanded or relocated to accommodate changes in load patterns — because each circuit is a separate, flexible cable that needs no conduit. Planned G-E cable systems are of growing importance to an industrial plant, and can have a major effect on the plant's efficiency. So, when you have to handle increasing loads, let your G-E wire and cable specialist help you with the planning. For more information on G-E cable systems, write Section W127-1264, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

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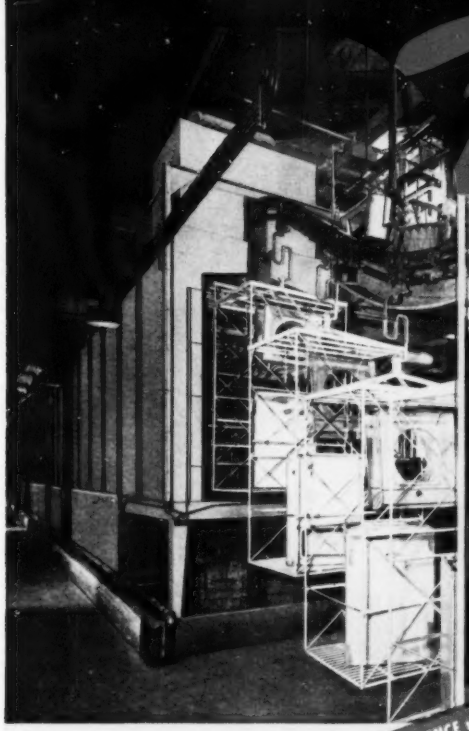
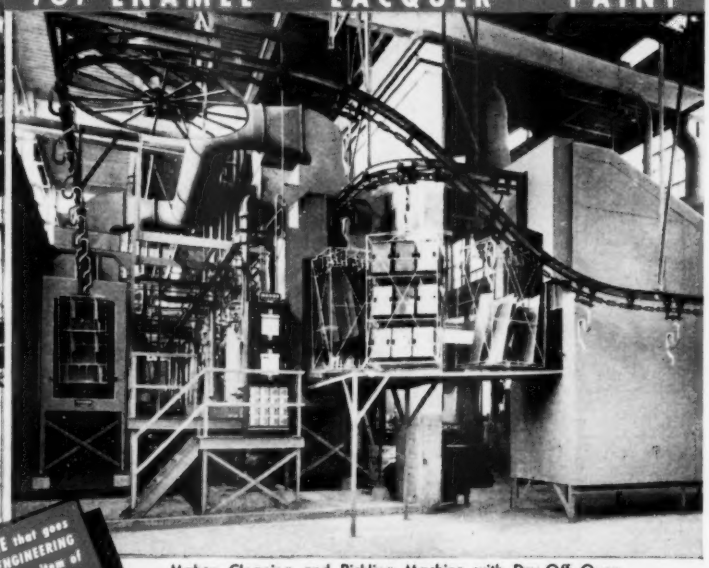
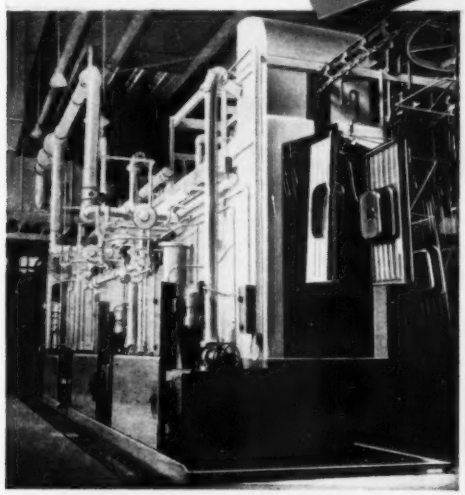


Mahon Cleaning and Pickling Machine Installed as Part of a Complete Finishing System for one of the World's Largest Household Appliance Manufacturers.



Mahon Cleaning and Pickling Machine with Dry-Off Oven Installed in the Plant of a Leading Electric Range Manufacturer.

. . . the EXPERIENCE that goes into the PLANNING and ENGINEERING of MAHON EQUIPMENT is the item of GREATEST VALUE to YOU!



Mahon Cleaning and Pickling Machine Installed in the Plant of a Manufacturer of Porcelain Enameled Kitchen Sinks and other Units of Plumbing Ware.

Now, PICKLING OPERATIONS can be included in your CONVEYORIZED FINISHING SYSTEM!

Pickling operations no longer require a separate room with elaborate ventilating, fume control, and air replacement equipment. Cleaning and Pickling, preparatory to porcelain enameling, can now be done on the same overhead monorail conveyor that carries parts through other processing units of your conveyorized production finishing system. Pickling can be done in one third the time with more uniform results in a modern Mahon conveyorized spray-impingement Pickling Machine. All this is made possible by a Patented Hydro-Hermetic Seal on the Mahon Pickling Machine which effectively seals the top of the processing tunnel and provides positive protection for the conveyor track, trolleys and chain . . . no corrosive fumes can escape to damage conveyor parts. Sixteen of these Mahon Pickling Machines are now in operation in plants where descaling, pickling and rust proofing are necessary phases in the finishing process. Mahon Cleaning and Pickling Machines can be fitted right into your present finishing production system . . . they can be designed to meet any existing layout, processing requirement or production rate. Have a Mahon engineer call and give you complete information . . . and, let him tell you where and how a Mahon Conveyorized Spray Pickling Machine will cut costs in your present setup. See Sweet's Plant Engineering File for other Mahon Industrial Equipment, or write for Catalog A-655.

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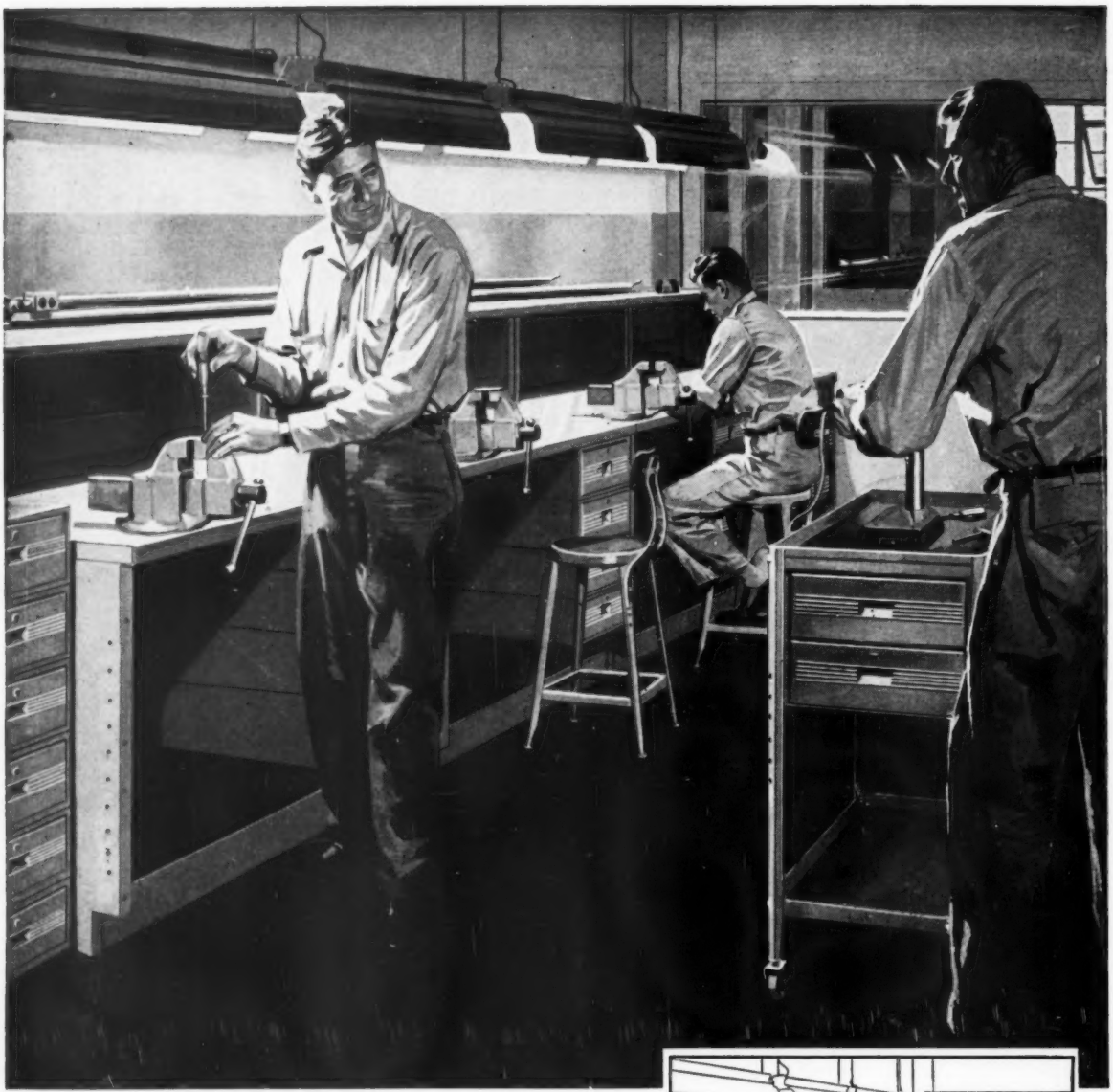

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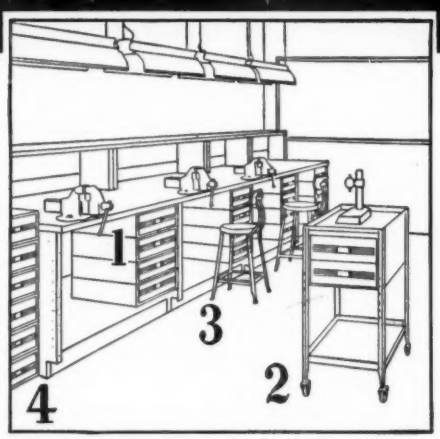

1. Cabinet Benches
2. Tool Stands
3. Stools and Chairs
4. Drawer Tiers

HALLOWELL® SHOP EQUIPMENT DIVISION SPS JENKINTOWN PENNSYLVANIA

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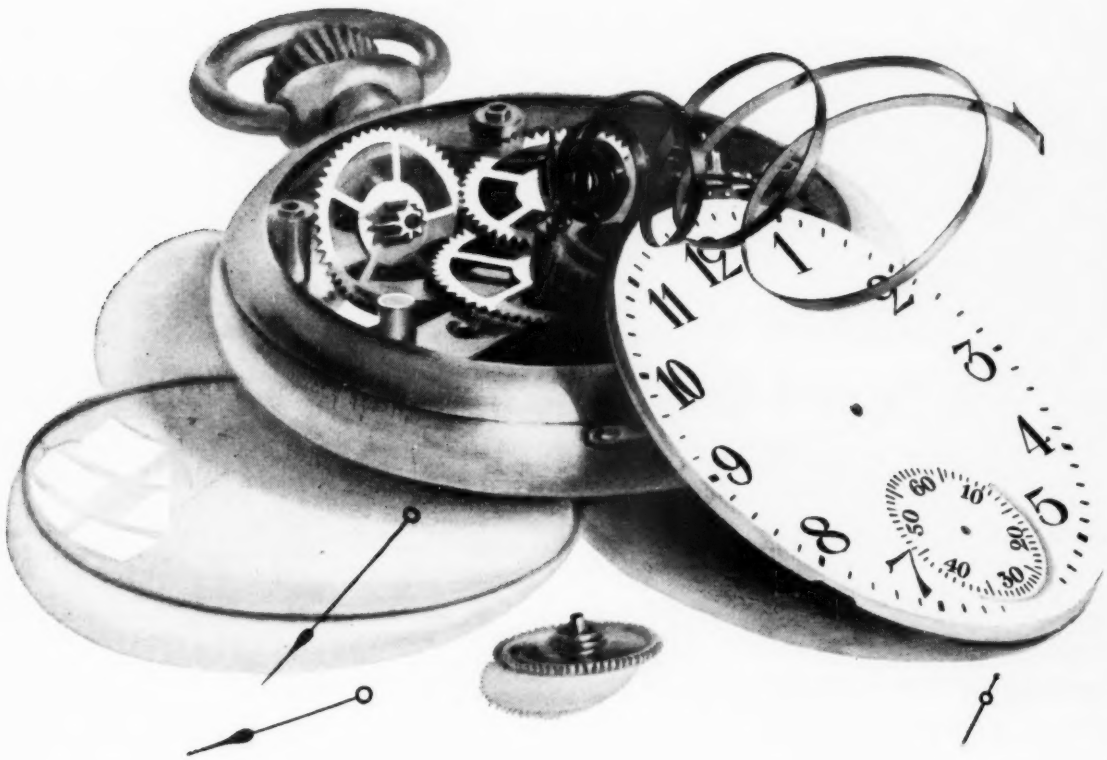
Everything a watch should have
—except the tick!



Your plant can't "tick" properly, either—without Correct Lubrication!

Like this watch, your plant may have all the right "parts"... the finest machines made... yet may not be "ticking"—running at top efficiency—because something is lacking. That "something" is called *Correct Lubrication!*

By Correct Lubrication we mean much more than just "oil" and "grease"—which any oil supplier can provide. We mean a detailed *program* of lubrication—designed specifically for your kind of machinery and type of operation.

Working with your personnel, we analyze all your machines and their operating conditions to determine their exact lubrication requirements. Then we recommend the *right* Gargoyle product for every moving part, advise on correct methods of application, set up proper lubrication schedules, follow up regularly with progress reports on benefits achieved.

In plant after plant, such a program has effectively boosted production—materially cut maintenance costs. It can do the same for you. Why accept less?

Socony-Vacuum

SOCONY-VACUUM

Correct Lubrication

FIRST STEP IN CUTTING COSTS

SOCONY-VACUUM OIL COMPANY, INC., and Affiliates: MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION

For more facts circle 522 on Reply Card

"THIS LUBRICANT SAVED US $2,098·16 IN SEVEN MONTHS"

—says THE BROWN COMPANY
Quality Paper Makers of Berlin, N. H.

"During a seven-month period before using LUBRIPLATE No. 130-AA in the bearing of our Kraft Mill Lime Kiln, we used a conventional oil at a cost of $2,134.00. In the seven months that followed, we used LUBRIPLATE No. 130-AA for initial filling and replacement at the cost of $35.84."

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE GREASE AND FLUID TYPE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

LUBRIPLATE is available in grease and fluid densities for every purpose... LUBRIPLATE H. D. S. MOTOR OIL meets today's exacting requirements for gasoline and diesel engines.

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

For more facts circle 523 on Reply Card

BACKTALK about our past issues

Edited by R. L. Marinello

Strength of Materials

PLANT ENGINEERING:

"Mr. B. J. Drummond, vice-president of the Detroit Chapter of the Plant Engineers' Society, has called my attention to the articles on 'Strength of Materials' which appeared in the July issue of Construction Briefs.

"I would greatly appreciate receiving the complete set to date, if possible.

"They are interesting, informative and very much worth-while." *Melville A. Jones, Senior Engineer, Detroit Steel Products Co., Detroit, Michigan.*

▶ A 12-page reprint, containing the first six articles in the Construction Brief series, is available for readers who may wish to have it for their files. The cost per reprint is 50 cents.—*Editors.*

Query on Disc Spray System

PLANT ENGINEERING:

"We would like to obtain further information on the new type electrostatic paint spray system recently installed by the Heater Division of the Eaton Mfg. Co., Cleveland. This is with reference to the article you published in the July, 1954 issue.

"We are interested in the following:

"1. Cost of electrostatic system as compared to pneumatic system.

"2. Ability of electrostatic system to handle viscous paints such as vinyl anti-fouling paint.

"3. Manufacturer of electrostatic disc sprayer and representative for Southern California." *L. C. Vogel, American Pipe & Steel Corp., P. O. Box 855, Hemet, California.*

▶ Additional information on this equipment may be obtained from the Ransburg Electro-Coating Corp., Indianapolis, Indiana, and we are notifying them of your interest in finding answers to your questions.—*Editors.*

Maintenance Storage Article

PLANT ENGINEERING:

"Would you be so kind as to send us one tear sheet of the article found on page 90, 'Maintenance Storage, a Business at Cincinnati Milling,' of your August, 1954 issue." *A. W. Allison, Jr., Maintenance Superintendent, West Virginia Pulp and Paper Co., Charleston, South Carolina.*

Highway Markings

PLANT ENGINEERING:

"I very much enjoyed the account of Mr. Hanson's recent visit to England wherein he reported on attending the annual Conference of the Incorporated Plant Engineers.

"I was particularly interested in the reference to the use on England's roads of 'Cat's Eyes' and the feeling that this method was superior to those of the United States. It may be of some interest to note that the use of these glass button reflective units was quite prevalent in this country about 20 years ago, but their use was gradually eliminated owing to several mechanical disadvantages, together with the development in the late 30's of traffic paint which achieves its reflection through tiny glass spheres embedded in the paint film.

"Highway engineers had found the 'cat's eyes' a considerable nuisance by reason of high cost and installation complications together with their inability to withstand snow plows and road equipment. Practically all center line marking has now been changed over to the less expensive reflectorized striping operations." *R. G. Buehring, Minnesota Mining & Manufacturing Co., Reflective Products Division, St. Paul, Minnesota.*

Talk on Maintenance Costs

PLANT ENGINEERING:

"In the September, 1954 issue, on page 2, you have an item entitled 'Maintenance Costs to Double.' Reference is made to a speech by Mr. H. F. McCullough, General Manager of General Electric Company's Service Shops Department.

"If it is possible for me to procure a copy of this speech, I would like very much to do so. Anything you can do to assist me will be greatly appreciated." *J. M. Newman, Plant Engineer, Buick-Oldsmobile-Pontiac Assembly Div., General Motors Corp., Kansas City, Kansas.*

▶ Our file copy of Mr. McCullough's speech is being sent to you with the compliments of the department.—*Editors.*

Emergency Manual

PLANT ENGINEERING:

"We have in mind the preparation of an emergency manual which will outline the procedure and assign responsibility for action in the event of any emergency, such as failure of power, water, steam, etc.

"We are well along in developing our planning; however, we do need to learn, by example, how to present the planning effectively.

"We are interested to know whether you have any manuals which would be helpful in this respect or if you have information relative to where such a manual may be obtained." *John Hansen, Department 13-11, Lockheed Aircraft Corp., Marietta, Georgia.*

▶ We understand that a very helpful booklet, suggesting what disaster and emergency steps should be taken to protect an industrial plant, is available from the National Safety Council, Chicago 11,

BETZ• *A Great Name*
In Water Conditioning

Strictly for the record

■ Recently, one of our visitors referred to this room as the Betz "Laboratory of Water Conditioning Experience". Actually, he wasn't far wrong.

For in these files are literally thousands of *staff-written* technical papers, articles, bulletins, and reports, covering just about any aspect of water conditioning about which industry might want information.

This represents the kind of leadership for which the Betz Organization is justly famous . . . the fundamentals of water conditioning written authoritatively, accurately . . . performing a service to industry not duplicated anywhere.

If you have a question, or a problem regarding *any phase of industrial water conditioning*, write us. Information covering the subject will be on its way to you promptly. No obligation, of course.

W. H. & L. D. BETZ, Gillingham & Worth Streets, Philadelphia 24, Pa. In Canada: BETZ Laboratories Limited, Montreal 1.

BETZ

CONSULTANTS ON INDUSTRIAL WATER PROBLEMS

For more facts circle 524 on Reply Card

HERE'S HOW THE NATIONAL CAR SHAKER WORKS:

1) Clamp it on the hopper car.

2) Press the button.

3) Watch the material come out.

GOOD FOR
COAL SAND
COKE CINDERS
and other bulk materials.

HERE'S WHAT THE NATIONAL CAR SHAKER DOES FOR YOU:

1) *eliminates up to 80% of manual labor.*

2) *reduces unloading time.*

3) *keeps conveying equipment going at full capacity.*

National Conveyor & Supply Co.
351 N. HARDING AVE.
CHICAGO 24

For more facts circle 525 on Reply Card

BACKTALK

Illinois. It is possible that you may be able to get some material from this booklet to include in the planning of your own emergency manual.—*Editors.*

Industrial Isotopes

PLANT ENGINEERING:

"We have read with interest the article on 'Industrial Isotopes' in the September, 1954, issue and would like to receive the 'Atomics' letters as they are published.

"Please send us the procedure sheets for the use of iodine-131 for detecting leaks in water lines and radioactivity tests for measuring cutting tool wear and life." *Harold Englund, Chemist, Johnson Service Co., Milwaukee, Wis.*

PLANT ENGINEERING:

"Please send mimeograph sheets explaining radioactive iodine for water leak detection and radioactive cobalt for liquid level indicating. Please place my name on the mailing list for 'Atomics.'

"Also, if available, please send a tear sheet on the article 'Here's How Reinforced Plastics Are Put to Work at General Foods,' September, 1954." *George L. Hagen, Plant Engineer, Reichhold Chemicals, Inc., Seattle, Washington.*

▶ Many readers have written in inquiring about the possible application of industrial isotopes in their plant operations. Since it would be impossible to present all of these questions in this department, we are planning to publish some of the interesting questions and suggested answers in a future issue.—*Editors.*

Seeks Info on Portable Hack Saw

PLANT ENGINEERING:

"We wish to obtain information on the portable hack saw, Hand-I-Hack, as described on page 115 in the May, 1954 issue of PLANT ENGINEERING.

"We would request that two sets of the information and the correspondence pertaining thereto be forwarded to us in order that one set may be referred to the Purchasing Department. Please mail to the attention of Mr. J. G. Gardner, Plant Maintenance Engineer.

"Would you please forward literature pertaining to this item at your earliest convenience." *J. G. Gardner, Plant Maintenance Engineer, Polysar, Polymer Corporation Ltd., Sarnia, Canada.*

▶ Your inquiry has been forwarded to Mr. Roy C. Brett, Advertising and Promotion Manager, Lipe-Rollway Corp., Syracuse, New York, and you should be hearing from him shortly.—*Editors.*

Instrument Article Request

PLANT ENGINEERING:

"If at all possible, please send me reprints of the article 'What an Instrument Department Might Do in Your Plant' by Chester S. Beard, beginning on page 96 of your September, 1954, issue. Also, please send me reprints of Part II of this article when they are available." *Glenn K. Smith, Mechanical Engineer, National Starch Products, Inc., Indianapolis, Indiana.*

▶ The second part of this article appeared in the October issue of PLANT ENGINEERING and tear sheets of it have been mailed to you.—*Editors.*

How Much for Maintenance?

PLANT ENGINEERING:

"I have been receiving your publication every month and read it very closely. In fact, I have been receiving and reading this magazine practically from the time of its inception and find it very educational and helpful to engineers, especially plant engineers.

"As a plant engineer, I have had many discussions with presidents, vice-presidents, managers, etc., of various types of companies on the relative cost of maintenance of equipment, buildings, property, etc., and invariably these discussions wind up without mutual understanding on the amount of money which should, or should not, be spent to do a good preventive maintenance job.

"What I would like to find out, if possible, is what percentage of the sales dollar should be spent on a good preventive maintenance program in the following industries: automotive assembly plant, aircraft fabrication and assembly, aircraft maintenance and accessories plants and small manufacturing plants.

"I feel, that if there is some data that has been developed along these lines, it would go a long way in helping to sell management on the needs of good preventive maintenance programs. I feel this information would be a great help for top management to realize the importance of a proper maintenance department, and it will also help the plant engineer in selling top management on the amount of money they need to do a good job of maintenance." *L. W. Degnan, Corporate Plant Engineer, Pacific Airmotive Corp., Burbank, Calif.*

▶ Mr. Degnan would be happy to hear from other plant engineers who may have information on what percentage of the sales dollar should be spent for a preventive maintenance program.—*Editors.*

Vote for Court Decisions

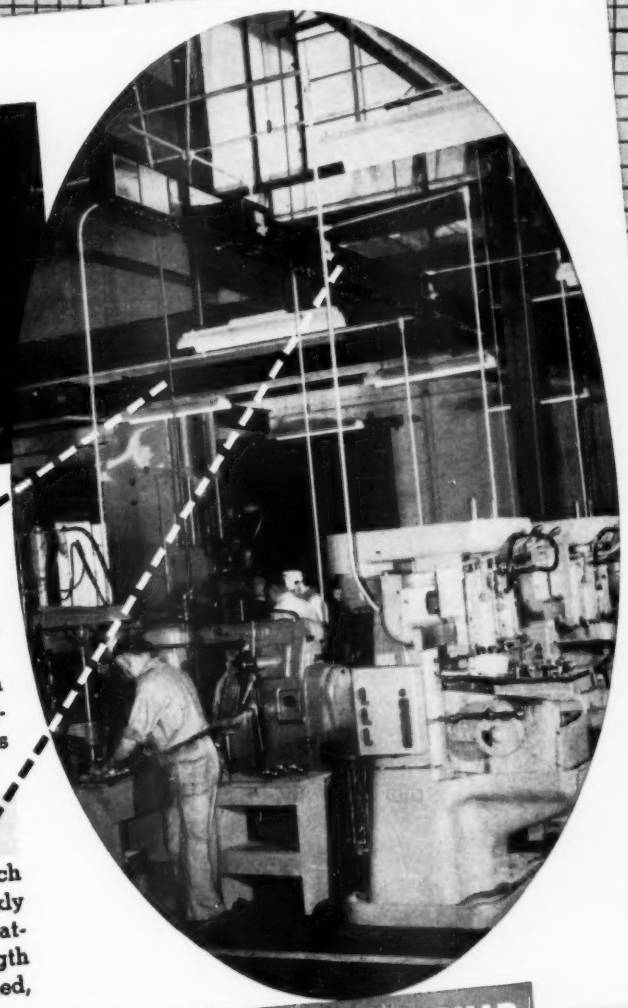
PLANT ENGINEERING:

"I find PLANT ENGINEERING interesting from cover to cover, easy to read and worth reading. I especially appreciate 'Court Decisions' by A. W. Gray. The cases presented are unusually informative and somewhat provocative." *W. J. Neely, Plant Engineer, The W. T. Rawleigh Co., Freeport, Illinois.*

For more facts circle 526 on Reply Card ⟶

for time-saving, money-saving

POWER DISTRIBUTION



SQUARE D FEED-IN DUCT

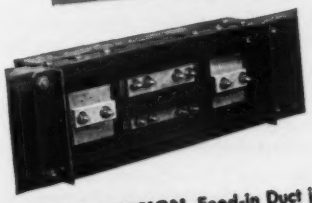
is the most efficient way to transmit large amounts of power. It provides the lowest known voltage drop—only 1.8 volts per 1000 amperes per 100 feet.

Exclusive design requires no ventilation—permits a totally enclosed, compact, dust-excluding enclosure. Rigid construction provides high resistance to heavy electrical stresses.

SQUARE D PLUG-IN DUCT

provides flexible power distribution for branch circuits. Machinery can be rearranged quickly at minimum cost. Plug-in units can be attached at frequent intervals along the length of the duct, providing power where it's needed, when it's needed.

BUSWAY FEATURES PROVE DESIGN LEADERSHIP



NEW JOINT DESIGN. Feed-in Duct joint design saves installation time and reduces maintenance cost. Duct ends are identical—unnecessary to select mating ends before positioning or hanging duct sections. Outward-facing, pre-installed bolts permit rapid assembly and easy maintenance.

ROUND BUS BARS for Plug-in Duct provide greater mechanical strength and resistance to short-circuit stresses. Circuit breaker or fusible type plug-in units are easily installed at 2-foot intervals along both sides of the duct. Plug-in stabs grip the round bus bars with exceptionally high pressure.

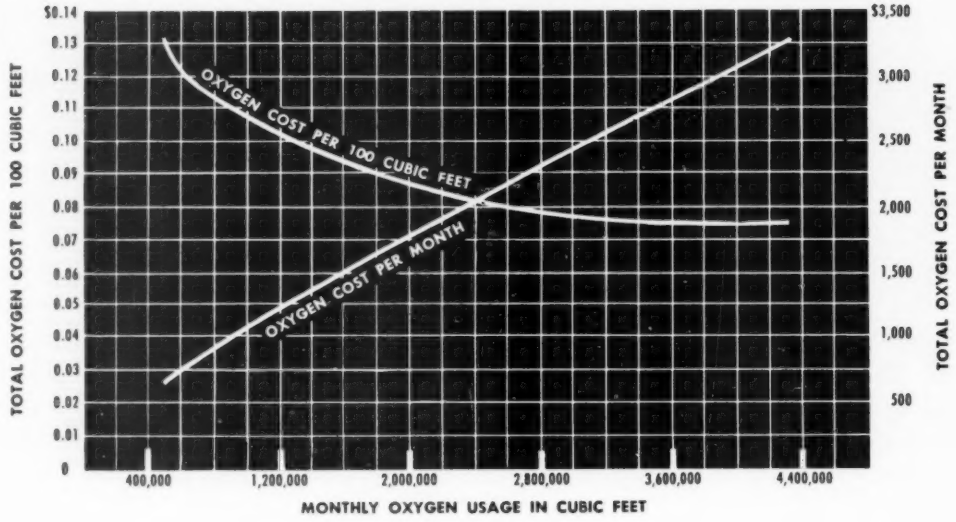
FLEXIBLE CONNECTORS of laminated copper join bus bars between sections—permit proper alignment, insure tight joints and provide for expansion and contraction at Plug-in duct joints. All bolt heads face outward for greater accessibility.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

OXYGEN USERS: If you use between 600,000 and 4,000,000 cu. ft./month

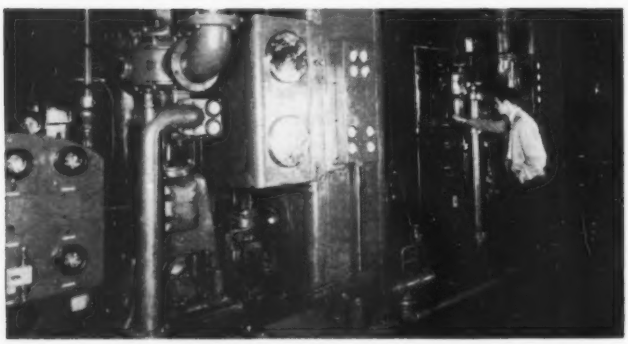
HERE'S ALL YOUR OXYGEN NEED COST* YOU!



Investigate the JOY OX-20 Oxygen Generator

CAPACITY—2000 cu. ft. per hour . . . PURITY—99.5%

The Joy principle of oxygen generation not only affords high-purity oxygen at the lowest possible cost. The unit (see twin installation pictured below) is also as reliable and easy to handle as an air compressor—and it's absolutely safe and fully automatic in operation. What's more, there are no bothersome chemicals to handle and store; no messy chemical wastes to remove. • If your oxygen usage is between 600,000 and 4,000,000 cu. ft. per month, let us give you facts and figures on a JOY oxygen generating installation to do the job for you. *Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.* In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario*



***Above costs include:**

Power (at $0.01 per KWH)
Water (at $0.10 per 100 cu. ft.)
Attendance Labor (at $2.00 per hour)
Maintenance (Labor and Parts)
Amortization (Ten-year Basis)

Consult a Joy Engineer

WAD 15388

JOY

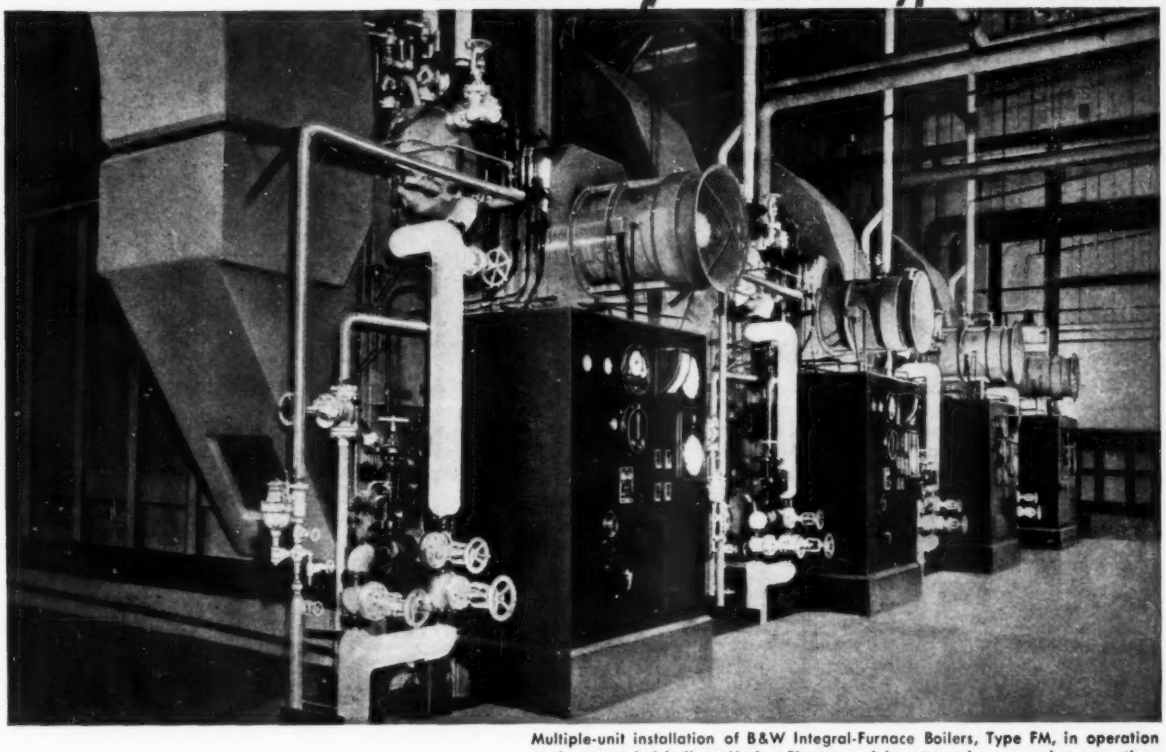
SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

For more facts circle 527 on Reply Card

keeping steam cheap . . .

THE YOUNGSTOWN SHEET AND TUBE COMPANY

installs 4 *B&W Type FM Boilers*



Multiple-unit installation of B&W Integral-Furnace Boilers, Type FM, in operation at the expanded Indiana Harbor Plant, supplying steam for processing operations and heating in the cold-reduction plant.

When The Youngstown Sheet and Tube Co. decided to extend its existing Indiana Harbor Plant at East Chicago, Ind., it made a choice between the installation of large or small boilers to meet the increased demand for steam.

Impressed by the compactness as well as the relative cost per pound of steam, company engineers selected four B&W Type FM Units—leaving space for a fifth unit—rather than two larger boilers, and, as a result, effected substantial savings in both installation and operation. Placed in service in November 1953, each boiler is oil-fired and has a steam capacity of 28,000 lb per hr. The four units are being operated in conjunction with three older B&W Boilers of greater capacities, to produce steam for both plant processing and heating.

The already large and growing acceptance of the B&W Type FM Boiler for a wide variety of industrial, commercial, institutional, and other applications rests on a solid record of service satisfaction . . . is reflected by the number of units now in service or on order, having a total steam capacity exceeding 9,000,000 lb per hr. Ideal for small to medium-sized plants, the FM Boiler is often selected even for larger installations—as at The Youngstown Sheet and Tube — to assure efficient, economical operation while avoiding the complete field erection and close operating supervision required by big boilers. It is available in standard sizes for loads ranging between 2900 and 36000 lb of steam per hr at pressures to 235 psi. Special units are obtainable for higher pressures.

The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.

G-664

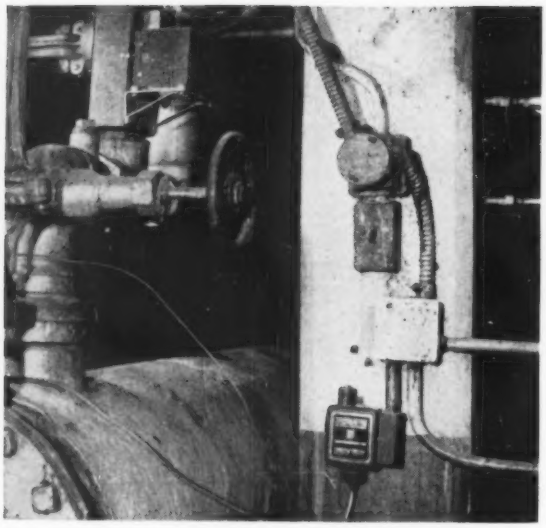
COST-SAVING FEATURES

- Saves Erection Time and Cost
- Meets Wide Range of Service
- Handles Quick Load Changes
- Fast Steaming
- Low Maintenance
- Easy Accessibility
- Suitable for Outdoor Service
- Burns Oil and/or Gas
- Saves Fuel
- Saves Space
- Safe, Automatic Operation

BOILER DIVISION

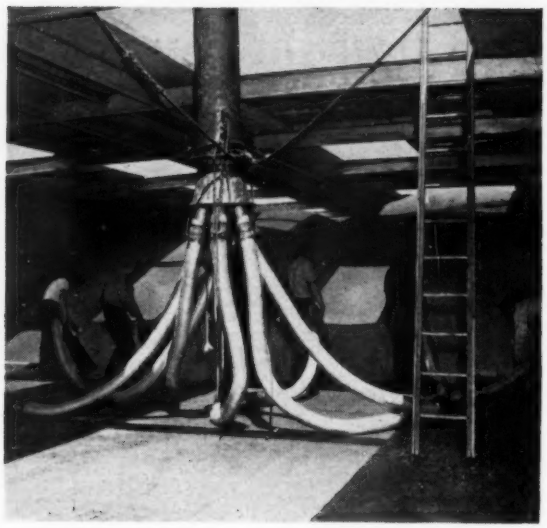
BABCOCK & WILCOX

For more facts circle 528 on Reply Card



To prevent syrup from carmelizing, *the American Molasses Company's Brooklyn plant installed a Honeywell Temperature Controller working with a* **Modutrol** *motorized valve in the low pressure steam line. Now syrup is kept properly heated and production stoppages are cut.*

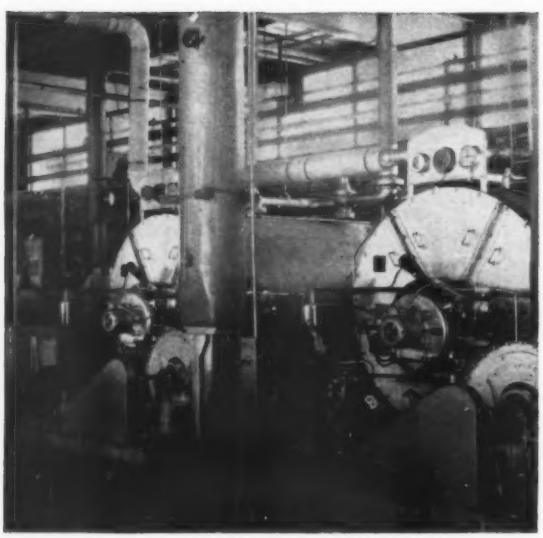
Control equipment cost—$150.00*



Time-consuming snags in grain ship unloading *are avoided by the Oregon Commission of Public Docks. Honeywell Controls, adjusted to regulate the line load, minimize dangers of vacuum lines becoming clogged . . . check sudden surges in suction which overload the motor.*

Control equipment cost—$174.25*

. . . . . Honeywell

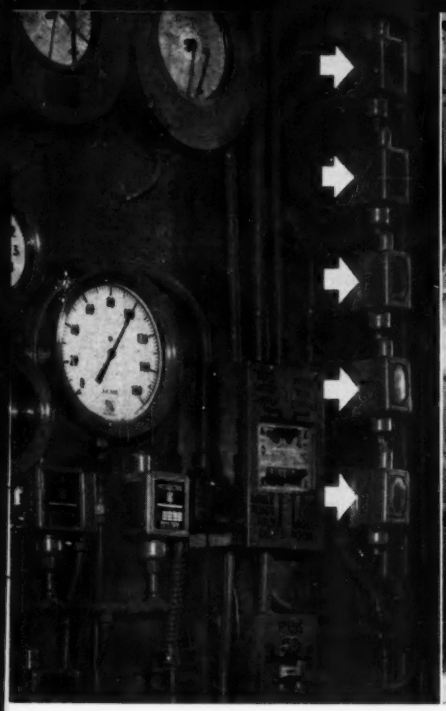


Boiler burner failures are quickly noted *thanks to a Honeywell Temperature Controller which senses and warns of any temperature changes in the hot water line. Here at the Norton Pike Co., the boiler can be re-lighted before costly drops in water temperature occur.*

Control equipment cost—$11.10*

Guarantee of sufficient heat *for processing of corn syrup is facilitated by a Honeywell surface type thermostat at the A. E. Staley Manufacturing Co., Decatur, Ill. This control prevents cold syrup from overburdening the pump motor and slowing output.*

Control equipment cost—$11.10*



Curing of concrete pipe is simplified *through the use of Honeywell temperature control systems (left) for five steam curing kilns at the Graystone Concrete Co., Seattle.*

Each controller regulates its own kiln, by actuating a **Modutrol** *motorized valve on the steam line . . . raising, regulating and reducing temperature as desired.*

Control equipment cost—$750.00*

Industrial Controls

Increase production

PRODUCTION can frequently be accelerated through the low cost application of a simple control to regulate automatically some phase of the production process.

For example, Honeywell Temperature Controllers, installed to regulate steam curing kiln temperatures, have stepped-up concrete pipe manufacture by doing automatically a job that at one time had to be done manually.

Similarly, throughout the many intricate phases of production activity, versatile Honeywell Controls are called on time and again to eliminate snags and increase output.

Honeywell Controls are inexpensive . . . and uncomplicated in installation and construction . . . designed to do a job effectively and at minimum cost.

Throughout your plant there are many opportunities for Honeywell Controls to step-up output . . . as well as reduce costs, lower maintenance, improve quality.

Your nearby Honeywell sales engineer will be glad to discuss how *you can increase production* through the use of these controls. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.

Also manufacturers of a complete line of precision measuring, recording and controlling instruments.

*List Price—Subject to change without notice.

H HONEYWELL

MINNEAPOLIS **Honeywell**

First in Controls

For more facts circle 529 on Reply Card

PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by M. E. Weissman

Experimental Forming of Titanium

ALMOST NON-EXISTENT as a pure metal five years ago, titanium has recently been the subject of a study made by our Engineering Division. This study was restricted to sheet metal manufacturing techniques of commercially pure titanium. Drop hammers, punch presses, brake presses and power rolls were some of the forming tools used.

In the first method of forming titanium in the drop hammer, sheets preheated in a portable furnace to between 900F and 1000F, were used.

First stamping operations began by treating the blanks as if they were stainless steel, except that they were preheated. High-temperature forming rubber was placed across the sheet in the flange area at the edge of the die, and the full impact of the hammer was used. In every instance this resulted in fractures at, or immediately below, the radiused edge of the die.

Next, a procedure was developed in which the number and position of the rubber pads were varied and the blank was inched down with lighter blows of the hammer. Between each hit, the blank was returned to the furnace and heated to the 900 to 1000 F range. In this way the parts were successfully formed. In this process dry lubricants were valueless because of the high furnace heat which burned out the binder, removing the lubricant's adhesive quality. Petroleum base lubricants could not be used because of the temperatures of the heated steel dies.

Although these arrangements were satisfactory on an experimental basis, we do not consider them adequate for production purposes.

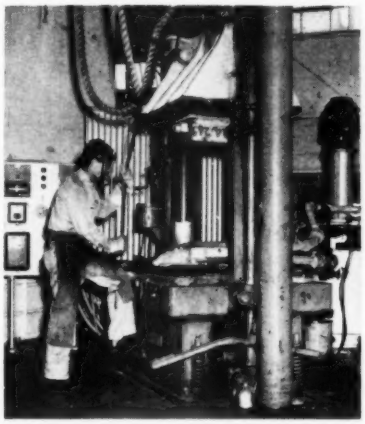
It was also decided to try the standard technique used to form stainless steel, a technique involving the use of Kirksite dies and lead punches.

To avoid the possibility of lead contamination and to prevent the heat from melting the lead, the punches were jacketed with mild steel on their contact faces. A generous coating of heavy weight commercial oil was applied to the die to serve as a lubricant and heat insulator.

Using this arrangement, with the blanks furnace heated to 1000F, the parts were repeatedly formed with satisfactory results. Temperature tests disclosed that the temperature of the blank, even when using cold tools, was higher than the hottest die temperature recorded under the previous heated die method.

These experiments have shown that commercially pure titanium parts can be formed as satisfactorily as stainless steel counterparts without basic engineering design changes other than judicious selection of edge and corner radii at abrupt contour changes, and the liberal use of stage dies.

It is primarily important to maintain blank temperatures above 700 F for optimum forming characteristics. Heated dies are not of practical use, while the use of cold Kirksite and lead tools offers an inexpensive, safe method of accomplishing the job. *From the Ryan Reporter, published by Ryan Aeronautical Co., San Diego, Calif.*



Drop hammer used in successful forming technique of commercially pure titanium

Maintenance of Pressure Gages

MAINTENANCE OF industrial instruments is vital to their accurate performance, but frequently simple dial pressure gages do not get correct care during installation and operation.

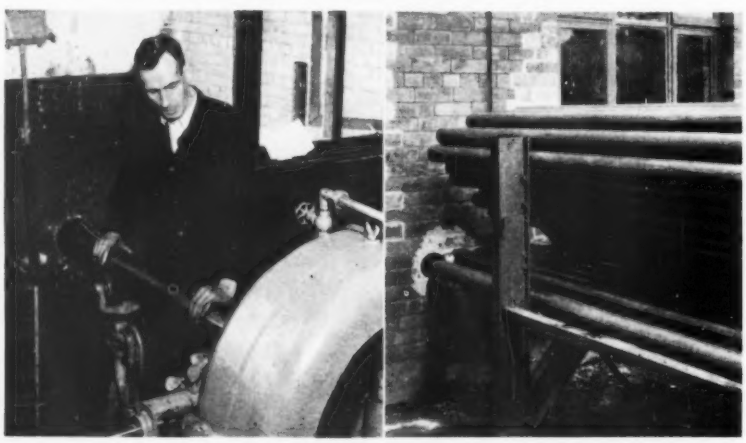
When a spare gage is taken from general stock it should be known what its inner working parts are made of and if the materials used are suitable for the intended job. A card index should reveal the scope of the gage and the lettering on the dial should give some indication of possible uses.

Gages mounted on walls or panels should be free of piping strains. This can be accomplished by use of loops, or by using flexible tubing for the last length of the impulse piping. In this way, expansion or contraction of a pipe or piece of equipment leaves the gage free from strain.

Mechanical vibration is another trouble that should be avoided by mounting the gage on a wall or stanchion isolated from the disturbance. Dirt, moisture and fumes will have no effect on special gages that have dust-proof, splash-tight and corrosive-resistant cases.

High ambient temperatures may cause inaccuracy by distortion of parts of the mechanism or of the case, thus dislocating pivots. Excessive heat can

Pull the Lever and Tubing Is Fed, via Wall, to Machine



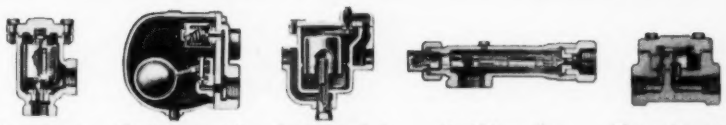
From gravity storage rack, at Richard Suttcliffe Ltd., England, tubing is fed through an opening in the wall direct to a cutting machine. As tubing is needed, operator pulls lever and tubes roll into position, ready to be pulled through the aperture with a pair of tongs. (From Target, published in London, England)

SARCO

A complete line of steam traps, temperature controls & heating specialties

Here are a few

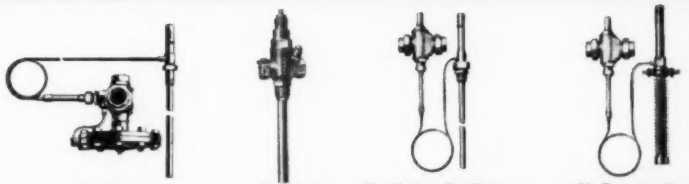
STEAM TRAPS



Thermostatic | Float-Thermostatic | Camlift Bucket | Liquid Expansion | Thermodynamic

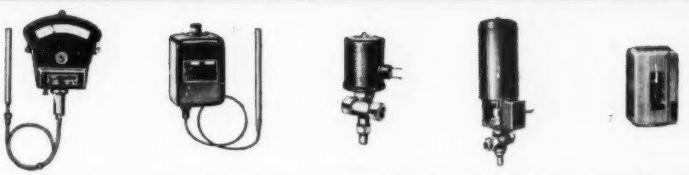
The right trap for each job . . . Only Sarco offers 5 functionally **different** types — not **variations** of one type!

TEMPERATURE CONTROLLERS



Heating | Cooling | Heating or Cooling | Air Temperature

ELECTRIC-THERMOSTATS AND VALVES

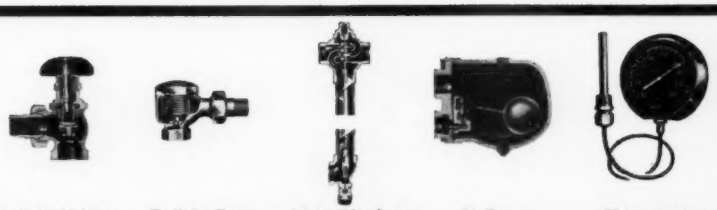


Indicating | Non-Indicating | Solenoid Valve | Motor Valve | Room Thermostat

AIR ELIMINATORS AND STRAINERS

Air Eliminators | Strainers | Scraper Strainers

OTHER HEATING SPECIALTIES



Radiator Valves | Radiator Traps | Water Blenders | Air Traps | Thermometers

BULLETINS

Send us data concerning your installation; we'll gladly send you bulletins and case histories. Sarco Company, Inc., Empire State Bldg., N. Y. 1, N. Y.

SARCO SAVES STEAM

2071-B

For more facts circle 530 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

also weaken the soldered tube joints used in standard type gages. Here again, are instances when special gages should be ordered.

Pressure elements must be protected from becoming filled with steam or with corroding gases or liquids. A syphon, sometimes called a pigtail, filled with water before installation, is used for steam gages. When the system is subjected to occasional vacuum, a piping leg, which remains filled, should be fitted. Its head effect should be compensated by resetting the pointer.

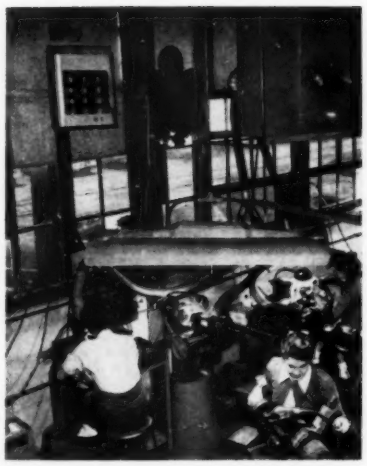
Membrane gages can be protected from injurious fluids under pressure by coating the membranes or by inserting protective, thin membranes of suitable material. A special sealing vessel may be applied to keep corrosive liquids away from the mechanism.

Protection from rapid pressure fluctuation can be obtained by use of throttle screws, labyrinths, needle valves and so on. *From Instruments In Industry, published by The Herbert Publishing Company, London, England.*

Electric Heaters in Ohio Plant

ELECTRIC SPACE heaters in an Ohio plant have cut fuel costs, made housekeeping easier and made available the space formerly occupied by a furnace.

By replacing the old central heating unit with ceiling mounted electric units, the Melin Tool Company of Cleveland, Ohio, freed 8700 cu ft for production and storage. Cold spots in the plant were eliminated and a uniform heat maintained. If desirable, the plant can be zone-heated to individual requirements, since each heater has its own thermostat.



Electric heaters, installed near ceiling throughout plant, reduced heating costs

There is no periodic maintenance on the new heating system, and because there are no combustion products, housekeeping is easier and faster. Figures for the one year the heaters have been in operation show that the $1000 spent annually on maintaining the old system has been saved and the total cost for the electric system was $3821. Fuel for the furnace used to cost about $4100 annually. *From a release for Industrial Heating Units and Devices Sect., National Electrical Manufacturers Assoc., New York.*

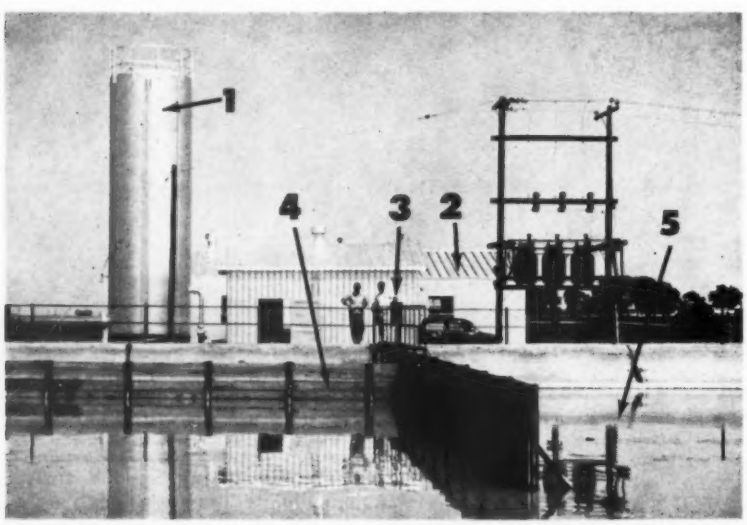
Renewed Water Boosts Oil Production

WHEN DROUTH came to Mattoon, Illinois, last summer, the Carter Oil Company ran into problems. The 85 oil wells in the Mattoon pool were pumping less than 300 bbl a day because there was not sufficient water for the 12 injection wells.

The answer to this problem of lack of water was found in the use of sewage water. Permission to buy Mattoon's waste water at regular rate was obtained from the local authorities. The company built its own treating plant and laid an 8-in. pipe line, three and one half miles long, from the sewage disposal plant to the injection wells.

First stage in the treatment of the waste water was to run it past a chlorine injector (3) which destroyed most of the bacteria and algae, also most of the odor. Next, the effluent was passed through a 7-ft deep, 12,000 bbl "settling pit" or slush tank.

A permeable dam-like barrier (4) in the tank filtered out the large foreign matter, while the smaller matter was settled in the remainder of the tank. Lastly, the water was re-chlorinated and pumped through two filters into a 30-ft, 420-bbl capacity storage tank (1), ready to be pumped into the injection wells. *From The Link, published by the Carter Oil Company, Tulsa, Oklahoma.*



Failing water supplies were revived when company bought waste water, treated it in a specially built plant, then pumped it three miles to injection well area

Magnetism and Measurement

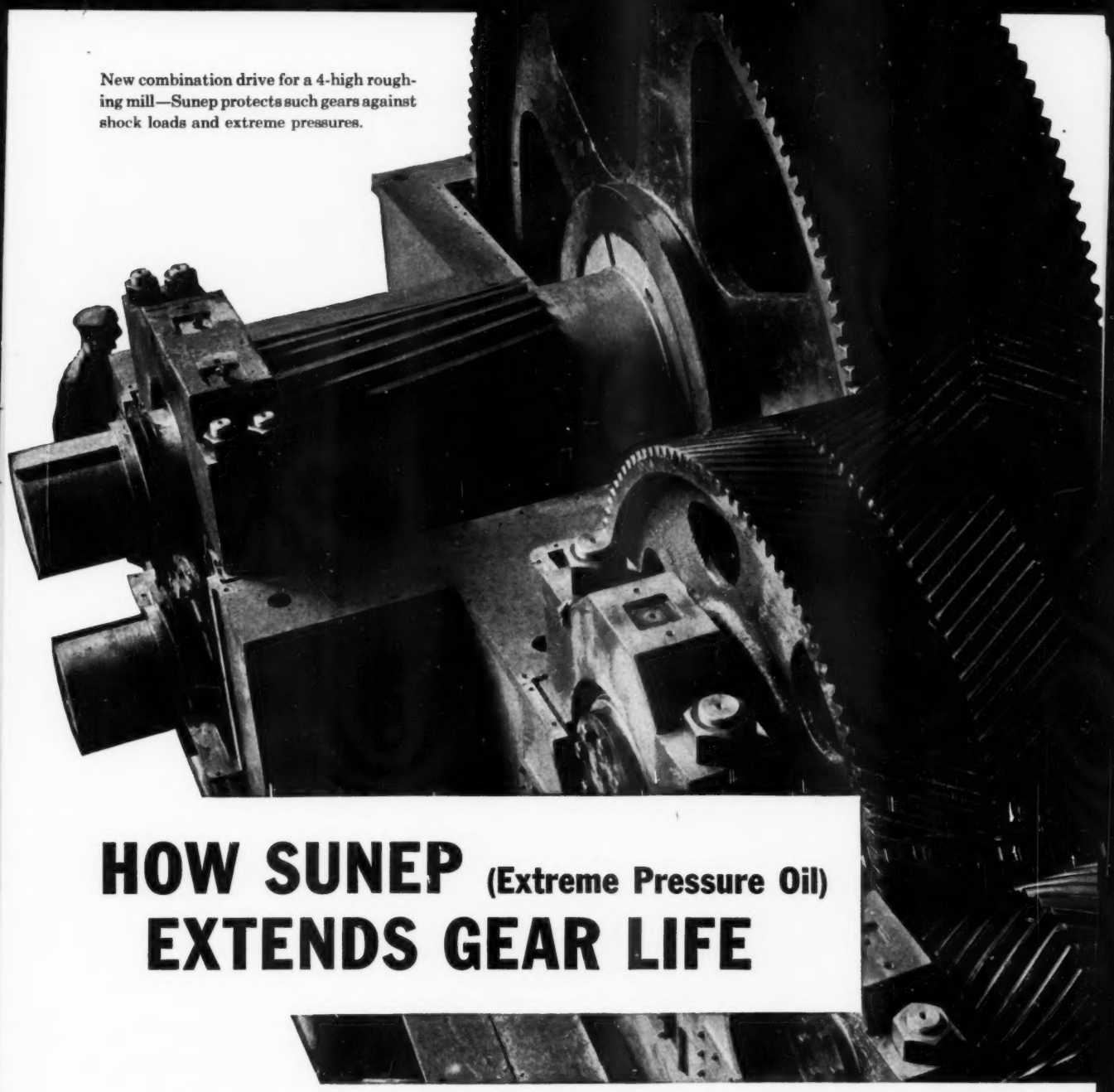
MANY POSSIBILITIES appear to exist for the development of new measuring instruments based upon magnetic phenomena.

Magnetostriction effects which change the length and volume of magnetized rods; the bending of a rod when magnetized; the twist in a rod in a magnetic field and the change in magnetic induction of a rod under stress in a magnetic field, could be incorporated into measuring devices.

The production of sounds and vibrations by bodies in a magnetic field, such as the tone made by an electromagnet when rotated in a magnetic field, and the click emitted by a rod when a magnetic field is applied or removed, provide possibilities for new instruments.

Changes in a calibrated bridge circuit, caused by the application of a magnetic field might also be used for measurement.

Since some metals show a change in thermal conductivity when exposed to a magnetic field, the temperature dif-



New combination drive for a 4-high roughing mill—Sunep protects such gears against shock loads and extreme pressures.

HOW SUNEP (Extreme Pressure Oil) EXTENDS GEAR LIFE

The advantage of running your machines at high speeds and under heavy loads can be quickly lost if your extreme pressure lubricants turn thick, lose film strength, or cause gears to corrode.

Sunep gives your gears better protection longer. Unlike many E.P. oils, Sunep is made from highly refined, premium grade oils skillfully blended with chemical additives that do not drop out during operation or in prolonged storage. This accounts for several rare user benefits: long life at extreme pressures; absence of corrosion—even on bronze; rust protection for steel parts; clean gears and bearings as a result of the oil's high stability.

Primarily a lubricant for enclosed gears, Sunep has proven to be highly effective on bearings and screws working under extreme pressures. Because of its exceptional clinging characteristics, Sunep guards against metal-to-metal contact during the early moments of machine operation after shutdown. FREE BULLETIN. Tells all about Sunep. Get your copy. Write Dept. PY-12

INDUSTRIAL PRODUCTS DEPARTMENT
SUN OIL COMPANY

SUNOCO®

PHILADELPHIA 3, PA. • SUN OIL COMPANY LTD., TORONTO & MONTREAL

Refiners of famous High-Test Blue Sunoco Gasoline

For more facts circle 531 on Reply Card

ORTON
Torque-Control
POWER CONTROL
WEAR CONTROL
• NO JERKING, slip-clutching or racing engines!
• CUSHIONED SHOCK—only the *exact* amount of power needed to move the load!
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PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

ferential might be useful in making measurements.

Other magnetic phenomena which might provide the basis for new measuring instruments are the double refraction of light observed in several mediums when subjected to a magnetic field, and that of spectral lines and vibration period of a monochromatic light source which are altered by a magnetic field. *From Applied Magnetics, published by Indiana Steel Products Co., Valparaiso, Indiana.*

Iron Horses Heat Station

WHEN IT WAS LEARNED that installation of a heating plant for Oceana Naval Air Station, near Norfolk, Va., would be delayed, two surplus locomotives were put to work to produce

Locomotives, "standing in" for heating plant, show single bifurcator fan

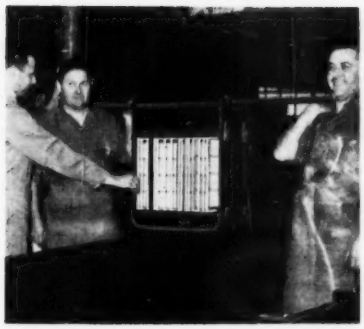
steam. This in turn provided hot water and heat for the expanded station.

Since a locomotive depends on forward speed to provide draft for its boiler, this temporary power plant was rigged with an induced draft bifurcator fan on the stack. This arrangement compensates for the lack of draft.

The Naval Air Station expects that the locomotives will serve adequately until early in 1955 when the planned heating system will be in operation. *From a release of DeBothezat Fans Div., American Machine and Metals, Inc., East Moline, Illinois.*

Acid Resisting Vats

MANUFACTURE OF METAL name-plates involves extensive use of acids. First the design is printed onto a metal plate with acid resisting ink, then it is baked dry. Twenty or 30 of these



Rack made entirely of laminated plastic holds metal plates to be etched in acid

plates are placed in a rack and lowered into a vat filled with concentrated acid. The plates remain in the solution until they have received the proper amount of etch.

Working life of racks ordinarily used for this operation was about five months, since nails and screws in the racks were eventually dissolved and racks themselves were damaged by acid.

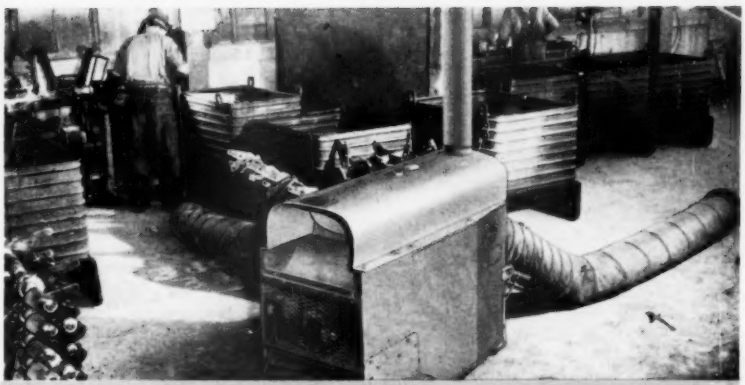
Racks not nearly as susceptible to acid damage are in use at General Etching and Manufacturing Company, Chicago, Illinois. Made entirely of laminated plastic, they have required no maintenance, nor show signs of wear during the year they have been used. *From This Formica World, published by Formica Company, Cincinnati, Ohio.*

Smoking Booths for Plant

WHEN A NEW, centrally located locker room was constructed on the second floor of our Carton and Container Division in Battle Creek, Michigan, numerous small locker rooms in the plant, designated as smoking areas, were abandoned. This meant that most employees would have a long walk to and from a "smoke" if the central locker room were the only smoking area.

Smoking booths, each seating four people, and installed at convenient lo-

Smoking booths located throughout plant save a long walk to central locker room



The Massey-Harris Company of Racine, Wisconsin, used this Herman Nelson Portable Heater to spot extra heat around workmen in a temporary welding shop. Work continued through the coldest winter days.

Why does Herman Nelson outsell all other portable air heaters?

Because: indoors or outdoors, Herman Nelson Portable Air Heaters are best for any job.

HERE ARE THE FACTS! Complete safety indoors . . . clean, fume-free, heated air in the working area, with all dangerous gases vented outside!

Maximum efficiency outdoors . . . with flexible canvas ducts channeling heat right to the spot where you need it!

More than 30,000 Herman Nelson Portable Heaters are in use today. Whether you buy, rent, or lease, you'll get the best deal if you see your Herman Nelson Distributor first. FLEET OPERATORS: Ask about our Fleet Users' Replacement-Leasing Plan . . . learn the *extra* advantages in standardizing on Herman Nelson!

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Best Known Name In

PORTABLE AIR HEATERS

DIVISION OF AMERICAN AIR FILTER CO., INC
MOLINE, ILLINOIS

FREE! MONTHLY WEATHER FORECASTING SERVICE
Better than 85% accurate over the past three years!

HERMAN NELSON
Division of American Air Filter Company, Inc.
Dept. 83, Moline, Illinois
Please send me your monthly weather forecast chart, with no cost or obligation to myself.
☐ We are in the market for a portable air heater. ☐ We are not in the market, but would like information for our files.

NAME_____
COMPANY_____
ADDRESS_____
CITY_____ STATE_____

For more facts circle 533 on Reply Card

Lowest Belt Cost

PER TON OF STEEL EVER PRODUCED BY ATLANTIC STEEL

Rhoads 81—10/12′ + Lap x 48″ heavy 3 ply Tannate Watershed Belt installed on 5 roll stand intermediate mill.

PROBLEM: To lower leather belt costs on a drive operating a 5 roll stand intermediate rod and Merchant Bar Mill and consequently to obtain lower manufacturing costs per ton of steel produced.

SOLUTION: After trying several makes of flat leather belting, Atlantic Steel Company, Atlanta, Georgia installed specially tanned 81-10/12′ + Lap x 48″ heavy 3 ply Tannate Watershed leather belting. This belt was specially tanned choice center stock leather developed by J. E. Rhoads and Sons, and as a result was able to withstand terrific heat and moisture plus exceptionally heavy starting and shock loads. Belt speed varies from 2600′ per min. to 6650′ per min. with the product rolled. After running almost continuously for 2½ years during which time the mill rolled 218,515 tons of steel, the belt was taken off, cut up into narrow belts and used in various departments around the plant.

Besides stating that Rhoads Tannate Belts have out-produced all other previous makes on this drive, Atlantic Steel officials calculated the belt cost per ton of steel produced at $.0209 cents per ton, the lowest belt cost ever attained by them.

What is Tannate®?

Tannate is a special tanned leather belt. It combines exceptional grip, pliability, elasticity, strength, and durability. It will resist moisture, mineral oils and the fumes of most acids —will withstand high temperatures. For specifications, write J. E. Rhoads and Sons, 35 North Sixth Street, Philadelphia 6, Pa.

Be sure to see our exhibit at the Power Show, Dec. 2-7, Convention Hall, Phila. We've got something new in power transmission to show you.

RHOADS
INDUSTRIAL LEATHERS

PHILADELPHIA • NEW YORK • CHICAGO • ATLANTA

For more facts circle 534 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

cations throughout the plant, solved the "traveling" problem. Stenciled designs mark them as smoking areas, and plant smoking regulations are posted on each one. The booths have proved convenient and popular. *From a release of General Foods Corporation, White Plains, New York.*

Carbon Blacks Container

RUBBER AND FABRIC make a new, collapsible container for transporting carbon blacks in smaller than tank car lots.

Adaptable to shipment by truck, barge or rail, the container is expected

Five-ton package of carbon blacks in new container is hoisted from truck

to reduce transportation costs, and waste, and to improve cleanliness.

The container is loaded at the top and can be emptied into a storage tank through valves and a canvas spout at the bottom. When filled, it stands 8 ft high, with a similar diameter. Weight is approximately 500 lb empty, 5 tons when filled. *From Firestone Non-Skid, published by Firestone Tire & Rubber Company, Akron, Ohio.*

Sprinkler Utilization Practice

SUGGESTIONS OFFERED for the full utilization of automatic sprinkler systems are based on actual experience.

1. Immediately upon arrival at a fire, check all valves controlling sprinklers in threatened areas to make sure that the valves are open. Sprinklers will hold the fire under control.
2. Station a fireman at each valve controlling the sprinklers which are in operation, to prevent their being closed by unauthorized persons.
3. Do not shut off sprinklers too soon.
4. Do not rob the sprinkler water

supply by taking pumper suction for hose streams from yard mains. Use public hydrants or nearby bodies of open water. This enables the company water supplies to be utilized for the sprinklers.

5. Use the pumper connection to the sprinkler system. Pumper draws from a public hydrant and pumps into the sprinkler system. This assures that the sprinklers will get water if other supplies prove inadequate. Water thus delivered is more effective than if thrown by hose streams.

6. Avoid unnecessary water damage. Use of sprinklers keeps down water damage. Intermittent use of 1½-in. hose with shut-off nozzles proves sufficient at most fires where sprinklers are operating, although large hose are always laid out ready for use. *From Factory Mutual Record, published by Factory Mutual Engineering Div., Associated Factory Mutual Fire Insurance Companies, Boston, Mass.*

Pre-Fabricated Stack Lining

LINING AN INDUSTRIAL stack is usually a costly and tedious job when bricks have to be laid individually, but Capitol Boiler Works overcame these disadvantages by installing prefabricated stack lining at its Rosslyn, Virginia, plant.

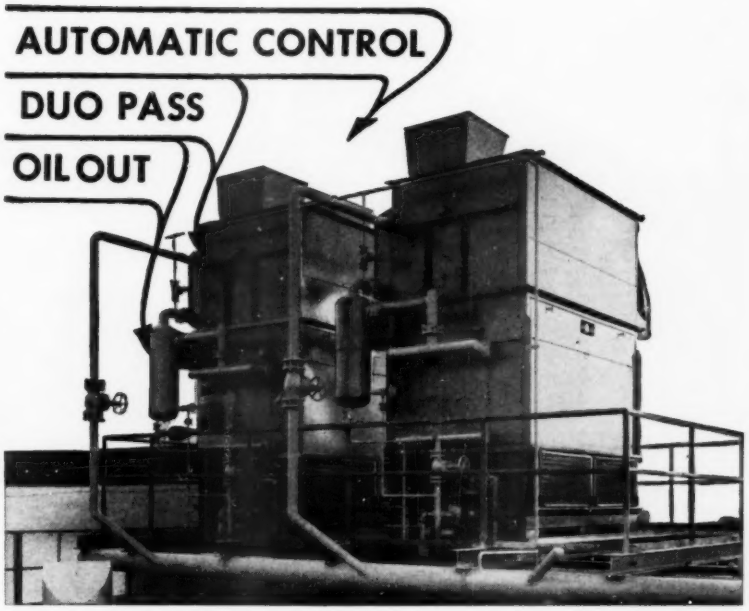
Prefabricated, 10-ft sections of insulating fire brick were welded together into a 40-ft incinerator stack, then placed in position by crane.

Before the sections left the manufacturer, the rings of fire brick were precision-machined for perfect fit inside the 24-in. O.D. metal stack. The rings were then pre-assembled and

Section of precision-made stack lining is put in place before welding it to others

cemented together in half sections ready for shipment.

In this way, installation costs of the new stack were reduced about 75 per cent. *From Armstrong's Insulator, published by Armstrong Cork Company, Lancaster, Pa.*



SAVE HALF THE ENGINEER'S TROUBLES ...WITH A REFRIGERATION PLANT

Hundreds of engineers have been interviewed about their experience with the Niagara Aeropass Condenser. In one way or another, they say, "I wouldn't go back to anything else." And their managers, who watch the costs, say, "Best investment we ever made, couldn't operate now, without it."

Niagara Aeropass Condensers have three exclusive features which save trouble and money in running a refrigeration plant:

"The Duo-Pass"— keeps scale and salts from crusting the coils, keeps the condenser always at full capacity.

The "Oilout"— removes oil and dirt from the refrigerant, at the exact point where the oil vapor is condensed and the refrigerant is not.

The "Balanced-Wet-Bulb" control gives automatic operation at the minimum head pressure, saving power cost the year 'round!

In addition, the Niagara Aeropass Condenser saves nearly all your cost of cooling water, quickly bringing back to you the cost of installation. In plants where refrigeration is a production process, owners know that this condenser has reduced their costs.

Write for Bulletin 103; Address Dept. PE

You can see one of these installations near you.

NIAGARA BLOWER COMPANY

405 Lexington Ave. New York 17, N. Y.

District Engineers in Principal Cities of United States and Canada

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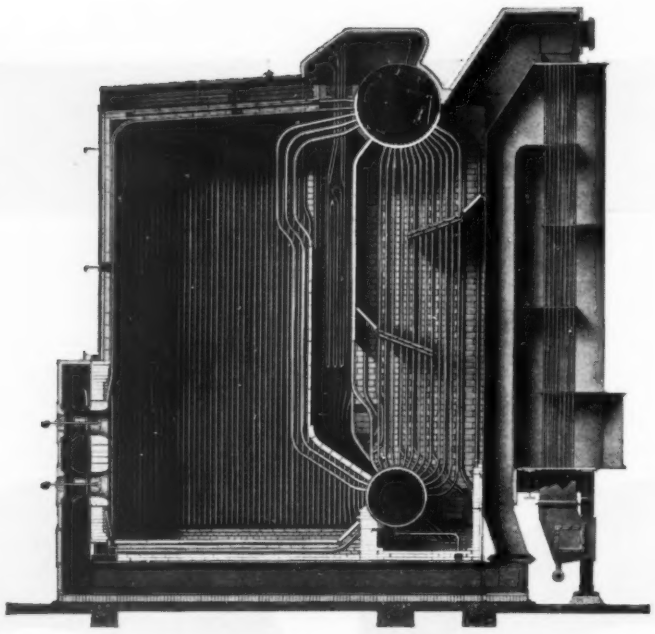
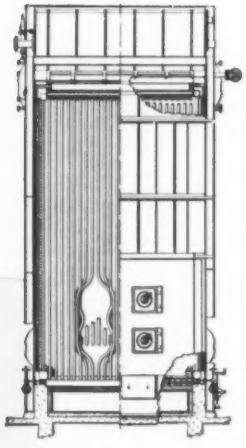
THE VU-55---



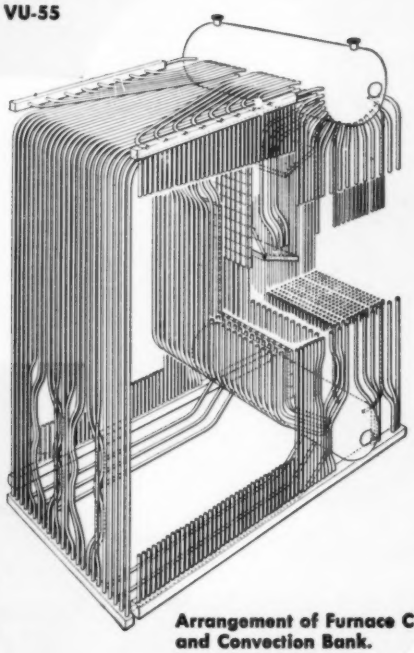
C-E Vertical-Unit Boiler, type VU-55



Front Elevation

SPECIFICATIONS

Sizes—Six sizes ranging from 50,000 to 120,000 lb of steam per hr.
Pressures—250 to 500 psi (all sizes)
Temperatures—as required up to 750 F
Fuels—oil or gas
Heat Recovery—Tubular Air Preheater



Arrangement of Furnace Cooling and Convection Bank.

A NEW MEMBER OF THE VU FAMILY

. . . for steam requirements from 50,000 to 120,000 lb per hr

One of the most important size groups of industrial boilers is that comprising capacities ranging from 50,000 to about 100,000 pounds of steam per hour.

Combustion Engineering has designed a boiler unit especially suited to the modern requirements of that capacity range. It is the Vertical-Unit Boiler, Type VU-55, here illustrated and described.

Developed with the same background of experience and engineering competence that is responsible for the service-proved success of Combustion's VU-family of boilers, the VU-55 offers numerous advantages to anyone whose steam needs fall within its application range. The more important of these advantages are:

ADVANTAGES

FURNACE ARRANGEMENT—The VU-55 is designed specifically for firing with oil or gas fuel. The furnace is high; the burners are set low in the front wall. The resultant long flame travel assures adequate mixing and proper combustion.

SYMMETRICAL DESIGN—Each transverse section through the VU-55 Boiler is the same as every other. Furnace gases flow across the surface of each section in equal amounts and at the same relative temperatures. Each section, therefore, absorbs the same amount of heat—produces the same amount of steam. Expansion of pressure parts is uniform; steam is released evenly across the length of the drum; water level is steady. Result—unit can carry high sustained demands or rapid load swings without pressure loss or effect on steam quality.

STEAM QUALITY—Equipped with a large (60-in.) steam drum, the VU-55 has generous water capacity and steam reservoir space. In addition C-E drum internals, which reflect many years of development and experience, assure high quality steam at all ratings.

HIGH HEAT ABSORPTION—Closely spaced side wall tubes (3 in. dia. on 4-in. centers) plus fully water-cooled front wall not only assure highest heat absorption but reduce furnace maintenance to a minimum.

STREAMLINED EXTERIOR—The over-all appearance of the VU-55 reflects the efforts of its designers to achieve a completely unobstructed casing while retaining adequate access wherever required and every facility for convenient operation. There are, for example, no outside downcomer tubes and ducts from air heater to burners are beneath the furnace floor.

In selecting your next boiler unit please consider this: You may be able to buy steam generating capacity for less (first cost) than you'll get with a VU-55. But you can't buy better. It's a matter of record that many — perhaps most — boiler installations cost more for the fuel burned *each year* than the *original cost* of the boiler. Consider, too, that when you buy a boiler you *live with it* for 20 or 30 — or more — years. Looks like the wrong place to select equipment on first cost alone. So — do not fail to investigate Combustion's VU-55. A qualified C-E engineer will be pleased to discuss any details with you or your consultants.

COMBUSTION ENGINEERING

Combustion Engineering Building • 200 Madison Avenue, New York 16, N. Y. B-777

BOILERS, FUEL BURNING & RELATED EQUIPMENT; PULVERIZERS, AIR SEPARATORS & FLASH DRYING SYSTEMS; PRESSURE VESSELS; AUTOMATIC WATER HEATERS; SOIL PIPE

For more facts circle 536 on Reply Card

OPERATION AND PRODUCTION pointers for the industrial plant engineer

Edited by H. E. B. Anderson

"Crash Pad" for Milling Machine

Contributed by R. E. Franklin

LIMITED SPACE in the machine shop tool room of Vauxhall Motors, Ltd., Luton, England, dictated that a battery of twelve Cincinnati horizontal millers be placed in line, facing alternately left and right. This permitted use of the full travel of the machine tables, with the table of one machine passing along the backs of the two machines placed on either side of it.

The arrangement fully utilized the floor space, but it resulted in an increase in head accidents reported by the machinists. The overarms of the millers, when not in use, were pushed to the backs of the machines to keep them away from the operators. However, the overarms projected so far back of the machines that they were a head-bumping hazard to the operators of the adjoining machines, when they stooped to pick up a tool, and straightened up quickly.

Sponge rubber pad on overarm ends provides protection for operators' heads

To correct the condition, the projecting ends of the overarms were fitted with sponge rubber pads. On a plywood foundation, shaped to fit the end of the overarm dovetail slides, 2-in. thick rubber slabs were cemented. The rubber padding has effectively reduced head injuries, and its bright yellow color acts as a visual warning.

Flexible Lines Beat Vibration

Contributed by J. R. Patrick

VIBRATION BREAKS in fuel and lubricant tubing, which occurred no matter how carefully the lines were installed and looped, have been remedied with flexible auto fuel lines. The lines are available in handy lengths, already assembled, with an interchangeable fitting for use with standard pipe fittings.

One example of a successful installation is a line installed on a water-cooled bearing cap on a boiler

(Continued on page 48)

Color Photography Invades Industry to Assist Assemblers of Electronic Equipment

COLOR TRANSPARENCIES, 8 in. by 10 in., are streamlining assembly methods in the electronic divisions of Bell Aircraft Corp., Buffalo, N. Y.

Prior to the introduction of the transparencies to the assembly areas, prototype models of each assembly were built and kept in the department to be referred to as guides during the wiring of similar units.

Assemblers wiring production units worked from blueprints and schematic diagrams, referring to the models frequently to confirm their readings of the prints and drawings. Consequently, traffic was fairly heavy between the assemblers' desks and the site of the model unit.

Use of the color transparencies as visual aids in the unit assembly not only speeds and improves the assembly, but releases the prototype for delivery as a production unit.

A transparency is made immediately after the prototype is completed, and delivered to an assembler. He mounts it in a viewer placed in front of him, and wires the unit directly from the photograph.

The transparency is portable, much less expensive to handle than the prototype unit, and can be filed to serve as a permanent record of the circuit. The number of blueprints and schematics is reduced, and in the case of an engineering change in a unit, preparing a new transparency is simpler than preparing and distributing a new set of drawings.

Old and new methods of electronic assembly. Transparency at right replaces blueprint as assembler's wiring guide

B.F.Goodrich

TW ANALYSIS helps forge plant increase industrial tire service over 500%

This truck is hauling a 5-ton die-holder in a large Cleveland forge plant. B. F. Goodrich oil-resisting tires on front wheels have delivered over 2688 hours of hard service where ordinary tires fell apart after only 500 hours.

THE maintenance men of a large Cleveland forge plant had a real problem on their hands. Industrial tires in heavy-duty service were "falling apart" under heavy loads after only 500 hours.

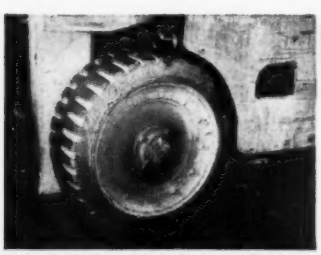
The local B. F. Goodrich man made a Tire and Wheel Analysis. As a result of his findings, new Deluxe Cushion Pressed-On tires with an oil-resisting compound were placed on a truck in regular service. Most of the trucks in this type of service have since been equipped with B. F. Goodrich oil-resisting-compound tires. Service hours have been increased more than 500%.

Pressed-On Deluxe Cushion tires are available with non-directional traction tread and in some sizes with smooth tread . . . and are made in a variety of compounds to meet any type of service condition. A special process that bonds the tread to the steel base assures positive adhesion of tread for life of the tire.

TW ANALYSIS CAN SAVE YOU MONEY

Just contact your local B. F. Goodrich retailer or mail the coupon below. Without cost or obligation, a trained B. F. Goodrich man will study your materials handling operations and make recommendations that can cut your industrial tire costs . . . reduce maintenance expense. The advice you receive will be unbiased, for B. F. Goodrich makes a *complete* line of industrial tires for every type of service. A special TW Analysis is available for manufacturers of industrial equipment.

Here's a close-up of the front tire on the truck pictured above. 2688 hours of service and still rolling!



This B. F. Goodrich Deluxe Cushion tire has been in service for 770 hours. Tread shows little wear.

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

Specify B. F. Goodrich tires when ordering new equipment

The B. F. Goodrich Company
Tire & Equipment Division
Department TW-434
Akron 18, Ohio

Please send me:
- ☐ Additional information on your Tire and Wheel Analysis Plan
- ☐ Free copy of "Industrial Tire Guidebook"
- ☐ Free copy of "How to Get Extra Service out of Solid Industrial Tires"

Name_____
Company_____
Street_____
City_____ Zone____ State____

For more facts circle 537 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 46)

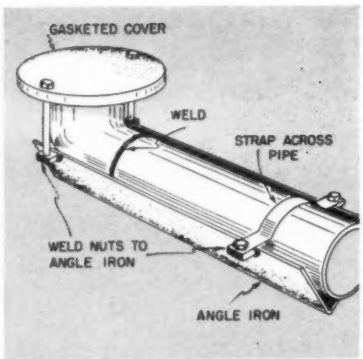
feed pump. Using a pipe coupling and nipple as a sump, visual examination of water flow is simple.

Another advantage of the flexible lines is the ease of removal for lubrication cleanouts. Small pipe lines formerly used usually corroded or broke off at the fitting when being removed.

Test Fixture for Pipe Welds

Contributed by J. P. Anderson
Allis-Chalmers Manufacturing Co.

IN THE PROCESS of fabricating welded pipe assemblies, it is often necessary to test a weld joining an ell to a length of straight pipe, with the end of the ell open. If the ell is unthreaded, a gasketed cover must be clamped over the open end, to seal the line.



Pipe ell is fitted with gasketed cover clamped in place for testing pipe weld

To simplify the welding test at Allis-Chalmers, a clamping fixture was devised, consisting of a length of angle iron (the size depending upon the pipe size to be tested), with two nuts welded on each end. At the ell end of the pipe, a gasketed cover is bolted to the angle iron, and on the other end, a strap holds the pipe.

Prior to the design of this fixture, which facilitates sealing the ell temporarily for the test, the pipefitters used C-clamps which tended to slip off the ell, or welded threaded nuts to the ell temporarily to hold the cover.

Telephone Checks Vibrations

Contributed by H. Nye Josleyn

CONVERSION of an out-of-date telephone receiver or radio head set earphone can produce a listening device or detector with a wide range of application and a high degree of sensitivity.

In addition to identification of machine noises, the detector is well suited

(Continued on page 50)

Preheating Techniques Make Welding of Cast Iron Pulleys Simple

REPAIRING CAST IRON PULLEYS and gears is usually successful to the degree that expansion and contraction stresses can be controlled. Generally accomplished in a furnace, preheating of the entire casting may be replaced by controlled heating with a blowpipe flame. Braze welding is preferred to fusion welding in these cases, because less heat is produced in brazing. Less heat produces less expansion and less trouble. Suggestions offered by the Linde Air Products Co., for using the blowpipe, will help in controlling expansion during welding.

If only one spoke is broken, first vee the break from both sides, then heat the entire part with the blowpipe flame, just above comfortable hand contact temperature. Then heat the spoke on each side of the broken one, and the rim section within the next three spokes. See Fig. 1. At the same time, gradually heat the area at the break until it reaches the braze-welding heat. Make the weld quickly, to avoid losing the preheat in the adjacent spokes.

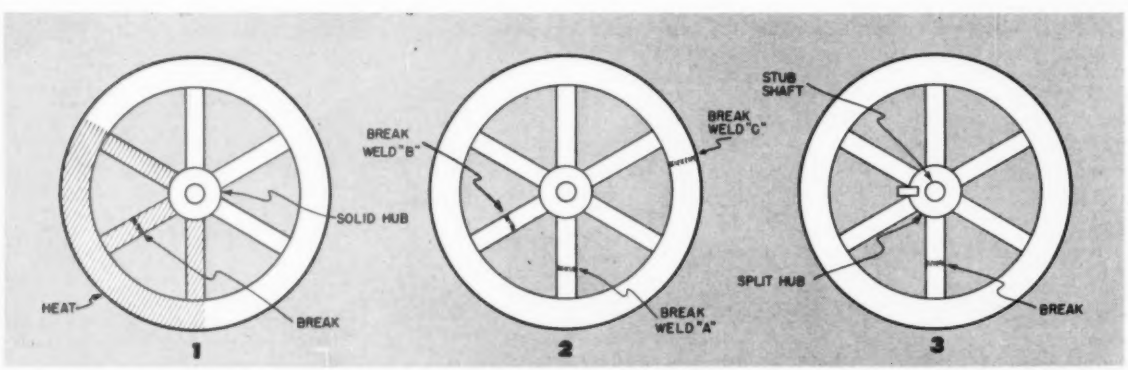
After making the weld, heat the adjacent spokes and the rim section until the weld has begun to cool. Cover the entire pulley to avoid drafts and rapid cooling.

The order of welding is important when there are several breaks in the rim and spokes. First vee the breaks properly, then make the welds in the spokes, with the same technique as for a single break, welding break A first. See Fig. 2. After weld A has completely cooled, weld break B, using the same preheat procedure.

Weld the rim break last. Heat the adjacent spokes with the blowpipe flame. If the rim break is midway between the spokes, heat each spoke to the same temperature. If the break is not centered between spokes, apply more heat to the closer spoke. It is also good practice to slightly heat the spokes adjacent to the closer spoke. Keep the fractured ends of the break slightly separated with a wedge or jack.

Too much heat to the rim in the vicinity of the weld will create pressure in the weld. The heating of the spokes, plus a slight heat in the rim section, added to some form of jacking will help maintain pitch dimensions. When the welds are completed, cover the part, to promote even cooling.

Welding of split hub pulleys or gears proceeds in essentially the same manner. To prevent distortion of the hub, clamp a stub shaft of the correct diameter in the hub. Then complete the repair in the same way as with the single break or multiple break situation.



Drawings illustrate methods of repair. 1—single spoke, 2—breaks in spokes and rim, 3—break in split-hub pulley

For more facts circle 538 on Reply Card ⟶

12 years of the right oil keeps air compressor . . . .

■ Keeping this air-compressor trouble-free and always on the job is a "must" at General Chemical's fluorspar mine located near Boulder, Colorado. Under rough conditions of fluctuating loads the compressor supplies air for air tools, rock drills, slushers and other vital mining tools.

Constant operation calls for an oil that will keep wear to a minimum . . . and assure trouble-free compressor out-put to keep these tools working.

In a recent twelve year stretch, STANOIL #31 was the oil relied on to keep this unit on the job.

At the end of this period the engine was taken down for inspection. With this hard-working oil assuring day-in day-out protection these were the findings. There were no carbon deposits and no cylinder wear. Protection had been so thorough that the rings showed *no signs of wear whatsoever!* In fact, they were in such like-new condition that they were put back into use!

STANOIL
TRADE MARK
Industrial Oil

. . . GOOD AS NEW!

This is Standard Oil's E. K. Arnston who helped General Chemical save time and money with superior lubrication. For help like this call your nearest Standard Oil office or write to Standard Oil, Chicago.

STANDARD OIL COMPANY (*Indiana*) **STANDARD**

Why Pay for Two Valves?

ONE ROCKWELL-Nordstrom Multiport will do the job better!

Send for this **FREE** Multiport Valve Chart that shows how Rockwell-Nordstrom Multiport Valves can cut your costs

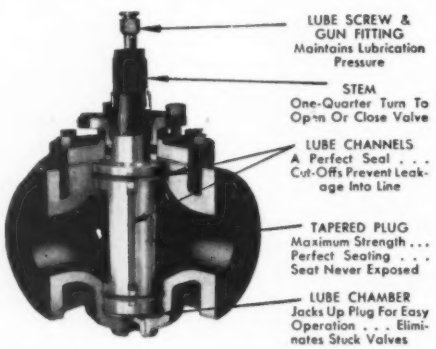
We've prepared a plastic chart with movable cross sections of the plugs to quickly show you how one Rockwell-Nordstrom Multiport can do the job of two or three ordinary valves. It's yours for the asking.

Rockwell-Nordstrom Multiports give you more than just the economy of reducing the number of valves—you also get valves that cost less to maintain, are easier to operate, and more dependable than any valves you've ever used. The key to efficiency in all Rockwell-Nordstrom valves—both Multiport and Straightway—is *pressurized lubrication* that eliminates metal-to-metal friction and forms a positive seal against leakage of even the lightest gases. You'll never have a stuck valve either, because a few turns of the lubricant screw "jacks up" the plug and frees it for quick, one-quarter turn operation.

Rockwell-Nordstrom valves are available in sizes from ½ in. to 30 in. and in steel, stainless steel and special alloy patterns that assure long valve life even on the toughest operations.

Send the coupon TODAY for your Multiport valve chart. Find out how Rockwell-Nordstrom valves can save money for *you*. Rockwell Manufacturing Company, Pittsburgh 8, Pa.

Canadian Valve Licensee: Peacock Brothers Limited.


LUBE SCREW & GUN FITTING
Maintains Lubrication Pressure
STEM
One-Quarter Turn To Open Or Close Valve
LUBE CHANNELS
A Perfect Seal . . . Cut-Offs Prevent Leakage Into Line
TAPERED PLUG
Maximum Strength . . . Perfect Seating . . . Seat Never Exposed
LUBE CHAMBER
Jacks Up Plug For Easy Operation . . . Eliminates Stuck Valves

Rockwell-Nordstrom Valves

Lubricant-Sealed for Positive Shut-Off

5433D

ROCKWELL MANUFACTURING COMPANY
400 North Lexington Avenue, Pittsburgh 8, Pa.

☐ Please send me a *Multiport Valve Chart.*
☐ Please send me a copy of the Rockwell-Nordstrom Bulletin V-217.

Name _____

Company _____

Address _____

City _____ Zone _____ State _____

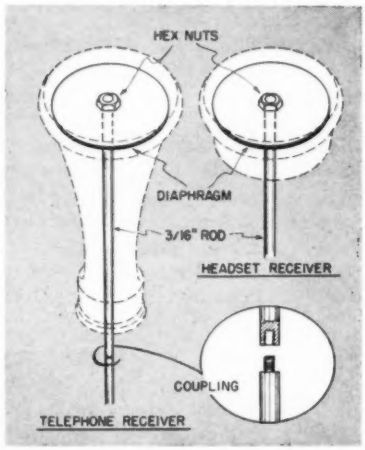
For more facts circle 539 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 46)

for locating leaks in water or steam pipes that are concealed in floors and partitions or located underground.

After removing the ear cap, washer and diaphragm of the telephone receiver, loosen and remove the magnet and wires. With a metal punch, taking care not to damage the thin metal, punch a ⅛-in. hole in the center of the disc. On one end of a 6-in. length of 3/16-in. welding rod, cut a short length of 6-32 thread, and on the other end, drill and tap the same size thread. Attach the male thread securely to the diaphragm, and fit additional lengths of threaded welding rod to the other end for adequate probe length.



Drawing of receiver and ear phone adapted to function as noise detectors

Because of variances in receiver design, it may be necessary to enlarge or reduce (with an adapter) the bore of the receiver to accommodate the rod snugly.

A single ear phone taken from a head set may be adapted similarly with equally satisfactory results.

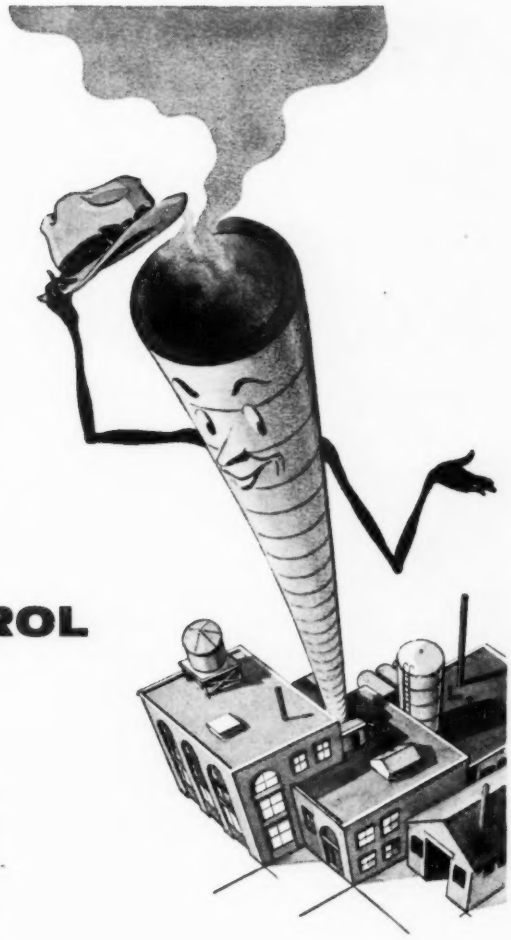
Quick-Change Transformer Spare

Contributed by J. R. Patrick

DOWNTIME RESULTING FROM a transformer ground or failure has been minimized by foresight in the form of a spare transformer.

Installed in the control cabinet, between the two operating transformers, the spare can be completely wired up to a cut-down barrier terminal strip, and the leads can be color-coded for ease of installation.

Either of the two active transformers can be removed from the circuit quick-



Some choice words about SELF CONTROL

The way Buell's famous 'SF' Electric Precipitator makes smoke stacks 'behave' has won an enthusiastic response from dozens of engineers and executives.

So enthusiastic, in fact, that they have examined the record from every conceivable angle. They've checked efficiency, economy and maintenance costs. They've even delved into basic engineering design. They've studied daily on-the-job performance records of Buell's 'SF' Electric Precipitators now operating from Pennsylvania to Peru! Finally, and most important, they've applied this information to their own smoke control problems . . . with marked success!

We'd like to put some of this information in your hands! You be the judge! Write today . . . Dept. 14-L, Buell Engineering Company, 70 Pine Street, New York 5, N. Y.

buell®

MECHANICAL ELECTRICAL

20 Years of Engineered Efficiency in

DUST RECOVERY SYSTEMS

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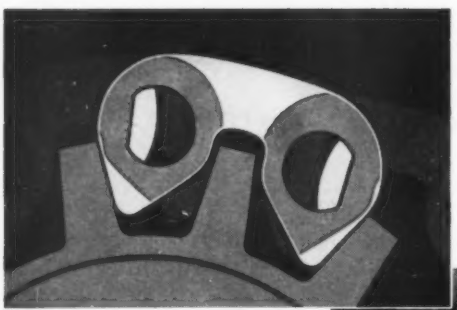
RAMSEY

with the most unique (and imitated) chain joint in the Industry

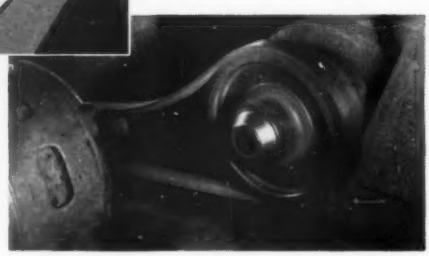
the only silent chain drive

that enables chain speeds up to

8000 fpm, with no special means of lubrication



The dependable and proven Roller Bearing Compensating Joint. Designed by Ramsey to reduce chordal action and permit high speed operation. Note its line contact between the flat surface of the link and the flat surface of the tooth. Link rolls smoothly into position on tooth, eliminating heat, noise, vibration.



An unretouched photograph of a typical Ramsey Drive. At high speed note its smoothness and lack of vibration. Only the Ramsey joint allows the chain links to follow such a true path tangent to the pitch diameter of the sprocket.

The Revolutionary Ramsey chain joint design, first announced in 1923, immediately made possible unprecedented high speeds. Today Ramsey chain drive is still the leader where high speed transmission and small driving sprockets are essential.

The *rolling action* of the Ramsey joint cuts out noise, vibration, friction, heat, and wear. Its large size permits the greatest degree of articulation, which in turn permits use with extremely small pinions — in some cases as small as 15 teeth, further enabling ratios as small as 10 to 1 in limited space.
All this without oil pump, slingers, or anything beyond a simple drip feed oil cup.

Driving pinion speeds go up to 6000 rpm for ⅜ pitch chain . . . 4000 for ½ pitch, 3600 for ⅝ and ¾ pitch . . . 2800 for 1 pitch . . . 1400 for 1½ pitch.

To secure all the advantages of a long-lived, vibrationless, truly high-speed chain drive, select RAMSEY. See your Mill Supply house or write us direct for the latest catalog and application manual.

SILENT CHAIN DRIVES – FLEXIBLE COUPLINGS

RAMSEY
CHAIN COMPANY, INC.
5154 BROADWAY • ALBANY, N. Y.

For more facts circle 541 on Reply Card

OPERATION — PRODUCTION

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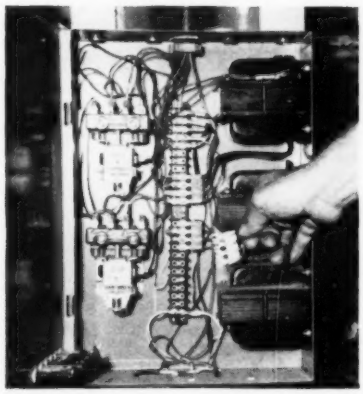


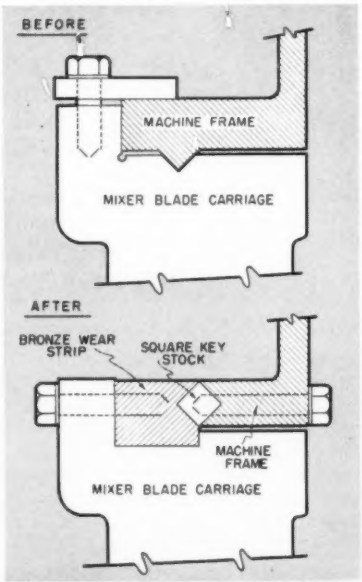
Location of spare transformer in cabinet for quick terminal installations

ly in case of failure. The spare unit, all ready for operation, is then immediately set into the circuit by tightening down the terminal strip in the vacated location. The inoperative transformer can then be removed and repaired without delaying production any longer than it takes to make the substitution.

Inserts Cut Machine Wear

Contributed by E. Herl, H. Blanchard
The Carborundum Company

INTERCHANGEABLE replacement inserts for machines subject to abrasive wear are an invaluable maintenance item, particularly in the abrasives in-



Cross section drawings show old and new methods of mating wear surfaces

two switches in one!

FA

type SCSD enclosed
SHUTLBRAK SWITCHES

Here's new switching convenience, flexibility and economy — both in cost and in operation — a switch that combines *both* interlocking and non-interlocking switch features in one unit.

Underwriter's Laboratories' approved, these new units embody all the features that made the (FA) Type SA Shutlbrak switch so popular, *plus* the added convenience and flexibility of quick, easy conversion to either interlocking or non-interlocking operation.

For motor control, service entrance or any job requiring a *standard duty* operating switch, these new units are ideal.

For additional information on these new, double-duty, low cost, safe, dependable switches, write for Bulletin No. 500 or consult your nearest (FA) representative listed in Sweet's. He'll be glad to discuss them with you.

(FA) SCSD SHUTLBRAK SWITCH HIGHLIGHTS

Quick-make and quick-break operation with interlock on full-opening cover. (Special release provided for access in "on" position by authorized person.)

Quick conversion to non-interlocking operation by manually shifting a simple mechanism inside the door — needs only a screw driver.

(FA) Kamklamp, pressure type fuseholders with solderless pressure connectors.

Rotary operating handle suitable for padlocking.

Positive "on" and "off" indication in cover.

CAPACITIES:

Type SCSD, 30 to 200 amps, 250 and 600 volts AC or DC 2, 3, and 4 poles, single throw.

Original design (FA) SAHD Shutlbrak Heavy Duty enclosed switches 30 to 1200 amps, also available.

Frank Adam Electric Co.
Box 357 Main P.O. St. Louis 3, Mo.

Makers of:
BUSDUCT • PANELBOARDS • SWITCHBOARDS • SERVICE EQUIPMENT • SAFETY SWITCHES • LOAD CENTERS • QUIKHETER

For more facts circle 542 on Reply Card

TOCCO Chose Reading Electric Hoists ...

This Reading electric hoist is moving a sheet metal cabinet from a heating station to the production line. All Reading hoists at Tocco have the same two-button pendant control.

● Rapidly rising production goals are being met in Ohio Crankshaft's new Tocco Division plant in Cleveland's South Side . . . thanks partly to Reading Electric Hoists.

Tocco, a leading producer of induction heating equipment, designed the new plant to meet the needs of its rapid expansion. Pre-planned materials handling, involving trucks, bridge cranes and electric hoists, is paying off in fast, orderly movement of materials from operation to operation.

Playing a big role in this integrated handling system is a series of Reading electric hoists, "custom-built" from standard Reading units to meet the exact requirements of each operation. These hoists permit Tocco workmen to move all material without manual lifting.

Reading's unique "Unit Construction" plan offers you special equipment for your own plant at the low cost of standard parts. Investigate now this proven way to get faster, better materials handling. A note on your company letterhead will bring a Reading engineer to analyze your handling operations . . . at no obligation.

Reading Crane & Hoist Corporation, 2103 Adams St., Reading, Pa.

READING HOISTS

CHAIN HOISTS | OVERHEAD TRAVELING CRANES | ELECTRIC HOISTS

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OPERATION—PRODUCTION

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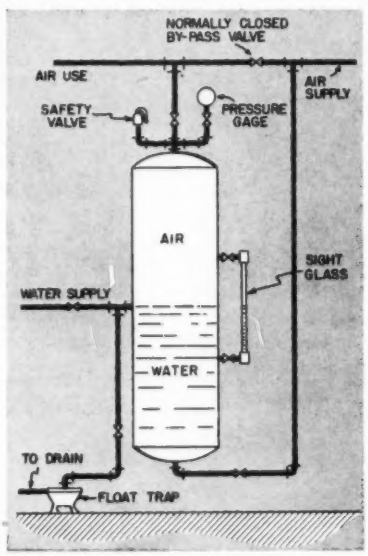
dustry. These parts, made of more abrasive-resistant materials than the basic castings which they replace, are generally less expensive, as well. Labor saving advantages are also involved in their use, since replacements can be made in the production area.

In this instance, a manganese bronze member, in the form of a v-grooved block, is mounted to run against a member made of square key stock. Each or both members can be replaced when worn to the extent that it is no longer possible to maintain alignment. The replacement of these inserts is done instead of replacing the machine castings—which were formerly subject to the abrasive wear now absorbed by the inserts.

Low-Cost Air Filter

Contributed by James G. Armstead
F. C. Huyck & Sons

SEVERAL YEARS of trouble-free operation of control instruments on an air-conditioning installation using



Water-filled filter for compressed air line serving pneumatic control system

pnuematic controls have proved the merit of an air filter designed and built by one of our steam fitters.

It consists of a vertical storage tank, of sufficient structural strength to resist the pressure involved, maintained about half full of water. As air enters at the bottom of the tank, dirt is removed and settles as sludge. Oil vapors in the air are condensed and collect as a film on the surface of the water, and

water vapor is condensed as it enters.

As contaminants tend to increase the level in the tank, an overflow feeds the oily scum and surface water to a trap which discharges it to waste.

The tank is not used as primary storage tank, but as a remote filtering station. The system consists of the compressor, an after cooler and the primary air storage tank from which lines radiate to the various points of air use. The tank described here is a supplementary tank, located as near as possible to use point. Since the air passing through the filter is at the lowest temperature in its cycle, instruments connected to the air lines from the tank are not troubled with moisture.

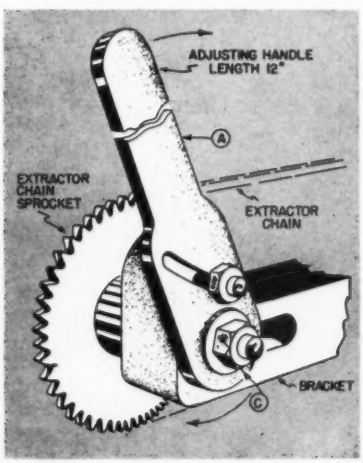
Two systems are in use in our plant. A ½-in. pipe size, 18 psig system uses a tank 12 in. in diameter and 40 in. high, while a second system, ¾-in. pipe size, 100 psig, uses a tank 20 in. in diameter and 60 in. high. In both cases, the tanks are of approved construction for the pressures involved.

Adjustable Chain Sprocket

TAKEN FROM THE plant suggestion system at Continental Can Co.'s Tampa, Florida plant, an innovation on a chain conveyor has proven instrumental in decreasing downtime caused by a conveyor jam.

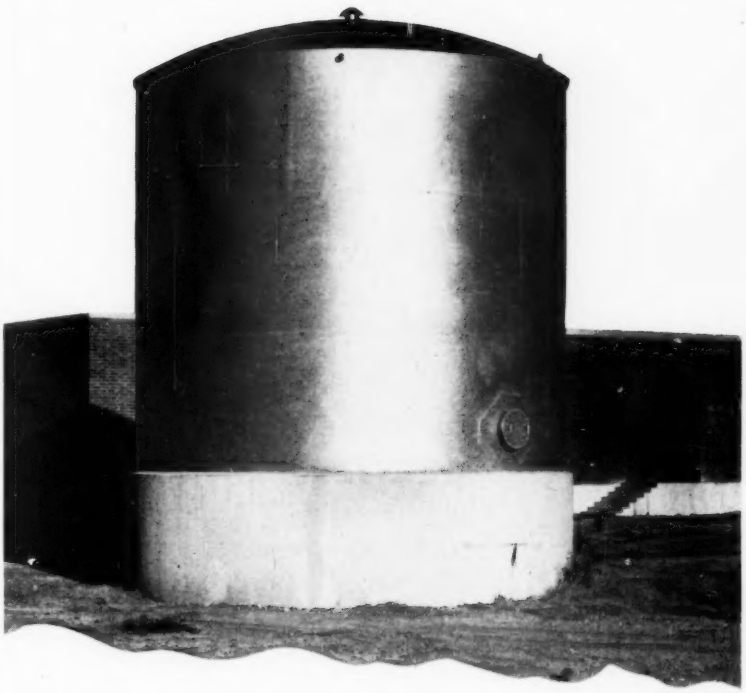
To clear such a jam, the chain was loosened by shifting the sprocket shaft at the end of the conveyor. Readjustment of this shaft, to attain proper stress in the chain, was difficult and tedious.

Slotting the bracket holding the sprocket, and mounting the sprocket on a slotted lever permits ready adjustment of the sprocket location. After clearing out a jam, the simple tightening of a lock nut completes the job.



Movement of adjusting lever A to right tightens chain, lock nut C secures it

FIRE PROTECTION



for Hosiery Mill . . .

The 100,000-gal. suction tank shown above was built by Chicago Bridge & Iron Company to provide the primary water supply for fire protection at the Belton Hosiery Mill, Belton, South Carolina. These mills, which are a subsidiary of Julius Kayser & Co., are leading producers of ladies full fashioned hose.

The suction tank is connected to an automatic sprinkler system which fully covers the mill's 55,000 sq. ft. of floor space. The sprinkler system was installed by Daniel Construction Company who built the entire plant.

To protect your own plant from the ever present threat of fire, and at the same time reduce your fire insurance premiums, investigate a Horton® suction tank or a Horton elevated water tank. They will often pay for themselves quickly in lower fire insurance premiums. Write our nearest office for estimates or quotations.

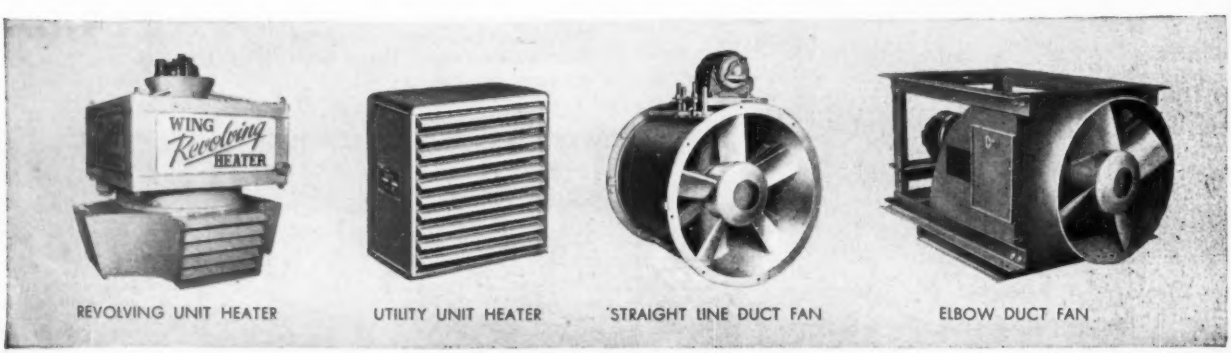
CHICAGO BRIDGE & IRON COMPANY

Atlanta 3	2148 Healey Building	Los Angeles 17	1574 General Petroleum Building
Birmingham 1	1555 North Fiftieth Street	New York 6	3317-165 Broadway Building
Boston 10	1067-201 Devonshire Street	Philadelphia 3	1649-1700 Walnut Street Building
Chicago 4	2134 McCormick Building	Pittsburgh 19	3243 Alcoa Building
Cleveland 15	2258 Midland Building	Salt Lake City 4	570 West 17th South Street
Detroit 26	1569 Lafayette Building	San Francisco 4	1582-200 Bush Street
Havana	402 Abreu Building	Seattle 1	1370 Henry Building
Houston 2	2166 C & I Life building	Tulsa 3	1669 Hunt Building

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.

In 1879, it was the new "Wing's Disc Fan"

It was 75 years ago that L. J. Wing, an ingenious Yankee who had come to New York with some ideas about mechanical devices, formed the company which later became the L. J. Wing Mfg. Co., for the purpose of manufacturing and selling "Wing's Disc Fan" which, according to his catalog, would "move more air than any other Fan made for heating, ventilation, drying, etc., as competitive trials have shown". Today, Wing products for ventilation, heating and combustion are known for their efficiency and dependability in all parts of the world. The company Mr. Wing founded has kept his ideals of originality and excellence constantly before them.



REVOLVING UNIT HEATER | UTILITY UNIT HEATER | STRAIGHT LINE DUCT FAN | ELBOW DUCT FAN

today, Wing Fans, Blowers, Unit Heaters, Draft Inducers and Turbines are serving industry the world over

OUR 75TH 1879-1954 YEAR

L. J. Wing Mfg. Co.

Linden • New Jersey

FACTORIES:
LINDEN, N.J.
&
MONTREAL
CANADA

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• PRINCIPAL CITIES •
EUROPEAN REPRESENTATIVE
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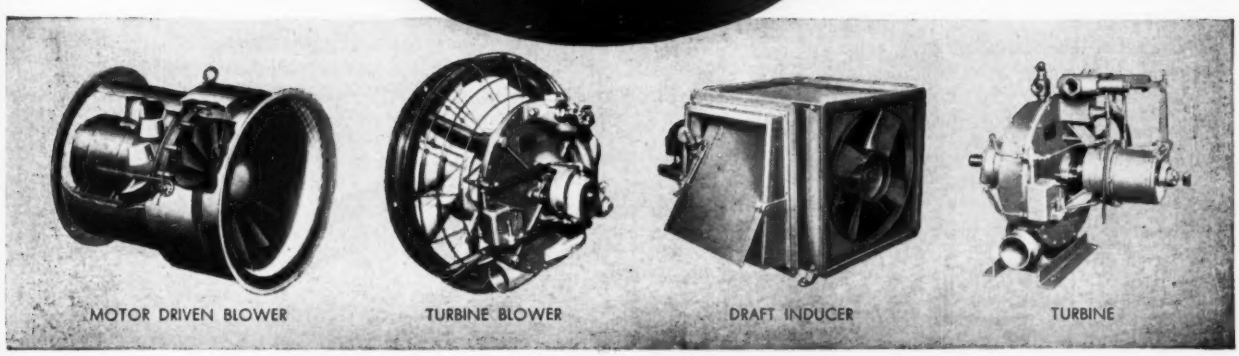

MOTOR DRIVEN BLOWER | TURBINE BLOWER | DRAFT INDUCER | TURBINE

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FIRST IN THE FIELD

JUMBODUCT

INDUSTRIAL UNDERFLOOR RACEWAY

APPROVED BY UNDERWRITERS' LABORATORIES, INC.

The Heavy-duty System for Modern Plant Wiring

National Electric JUMBODUCT offers industry three times the capacity previously available, freedom from the hazards of overhead wiring, *plus* outstanding economy. It's designed to provide readily accessible electrical distribution for industrial locations at a minimum investment.

You'll find a JUMBODUCT specification means:

Plenty of Capacity

4" x 4" cross section provides adequate room for electric wiring to banks of heavy production equipment.

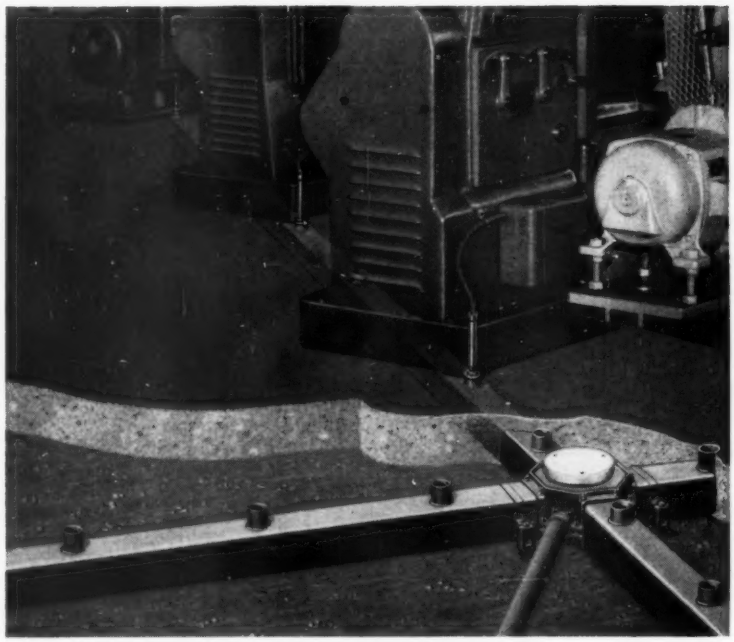
Efficient Power Distribution

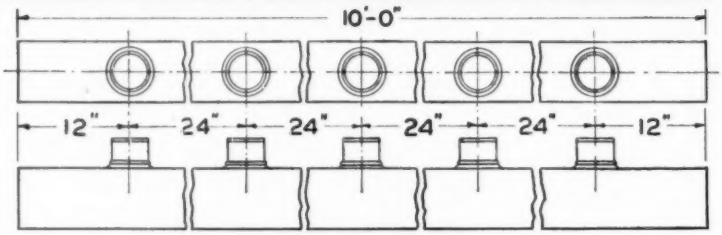
2" pipe threaded outlets every 24" permit exact location of equipment for most efficient production layout.

Low Cost

Furnished in easy-to-handle 10' lengths (complete line with junction boxes and a full complement of fittings), JUMBODUCT can be quickly installed in the same simple manner as standard Nepcoduct.

Close proximity of inserts to finished floor makes access quick and economical. Investment in conductors is limited to today's need with ample area for tomorrow's expansion.





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COURT DECISIONS — a summary of legal findings of interest to the plant engineer

Prepared by Albert Woodruff Gray

Exception To Anti-Smoke Ordinance

Power plant in New York City was charged with a violation of the provision of the Sanitary Code of that city prohibiting the discharge of dense smoke by industrial plants.

In sustaining the validity of this provision against the contention that it was unconstitutional as taking property without compensation, the appellate court in that state said of a well recognized exception to the legality of prohibitions of this character,

"It cannot be declared void unless it is clear or by evidence becomes clear beyond any reasonable doubt that it was not authorized by the legislature or that it unnecessarily and unreasonably interferes with private property rights and places an unreasonable burden, considered in the light of the benefit to the public, on the owner.

"It is evident that the object of this enactment was the prevention of the discharge of smoke of such a character and in such quantities that it might injuriously affect the public health or comfort or injure property and the court would not be warranted in conviction for a violation of this section excepting on evidence from which an inference to that effect might be drawn.

"This section should have a reasonable construction which would preclude a conviction from a mere accidental or occasional momentary discharge of dense smoke but which would insure the prevention of a continuous discharge or a discharge at intervals of large volumes of smoke such as is caused by use of soft coal."

Liability for Defects

A young girl working in a Boston, Massachusetts high school cafeteria was injured from the explosion of a bottle of soda water. This bottle, delivered to the cafeteria by a dealer, had been purchased by him from a Pennsylvania glass manufacturer.

By the law of Massachusetts and of many other states today manufacturers are liable for injuries from defects in an article of their manufacture even in instances in which the person injured bought the article from a dealer or some third party and not from the manufacturer with whom the purchaser had no transactions or contract.

In a celebrated case in that state a few years ago the court asserted the law to be that a manufacturer of anything that is dangerous or which might become so, who sells it to others, is liable for the use of reasonable care to prevent injury to anyone who might purchase the article.

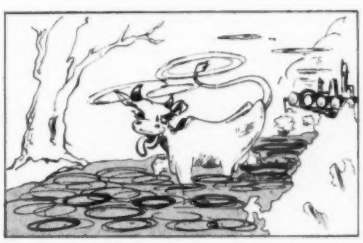
Here the court mentioned three exceptions to this rule. This would not be the law, said the court, if the injured person was not lawfully in possession of the thing that caused the injury, if the manufacturer depended upon the inspection of the article by a middleman or distributor or if the accident occurred through some intervening or unlooked for cause for which the manufacturer was not responsible.

The rule was summarized by the trial court and later approved by the appellate court in its affirmance of the award to this girl for the injury she received.

A manufacturer, said the court in its charge to the jury, is ordinarily required to exercise reasonable care in the manufacture of its goods when the goods if carelessly or defectively made, are likely to cause substantial harm to those who use them for the purpose for which they were manufactured.

Exemplary Damages

Crude oil escaped from the pits of an Oklahoma refinery where it had been impounded for a refining rerun into a nearby creek. This stream



crossed the land of a farmer a short distance below, who recently sued the refinery for the loss of two cows and his expense in obtaining water elsewhere for his stock.

The jury awarded the farmer not only the value of his cattle and this expense but an additional $1,500 as exemplary or punitive damages, a punishment of the refinery for its negligence.

From this judgment the refinery appealed. In striking out this additional allowance of punitive damages the appellate court referred as authority to an earlier case decided by that same court where it held that a person injured in this manner was entitled to recover damages of this character only when the injury carried with it malice, an evil intent or was the consequence of such gross negligence and disregard of the rights of others as to be equivalent to malice or negligence.

The circumstances of this case, asserted the Oklahoma Supreme Court in this decision, did not amount to such a disregard of the rights of others but that they warranted an award to the farmer of damages as punishment.

Waiver of Right of Rejection

A New York buyer purchased 269,109 half watt and single watt television resistors. The invoice which the purchaser paid, was endorsed, "Any resistors rejected will be replaced or refunded. Goods returned without permission will not be accepted for credit."

Two weeks after making the purchase the buyer complained that some of these resistors had a wattage varying from a half watt or a single watt, while the bodies of others were broken or had overlapping color bands.

The entire order was returned to the manufacturer to be recalibrated to a 10 per cent tolerance. Nothing in the original contract, however, was said of any return of these resistors for defects or imperfections.

Five months after this purchase was made and the invoice paid on which had been endorsed the limitation of the manufacturer's liability, the purchaser asked that the seller, "Permit the return of this merchandise which has been rejected and that you give credit for the full amount."

When the manufacturer refused to comply with this demand the purchaser sued to recover the $12,444.61 that it had paid for these resistors. The court in denying a recovery said,

"It has been many times held that the court will not make a different or better contract than the parties themselves have seen fit to enter into. When a contract is clear the court is bound to enforce it as it stands.

"The words employed in the contract will be given their ordinary and popularly accepted meaning in the absence of anything to show that they were used in a different sense. There is nothing in this case to show that the parties used the language that they did in any other than its popular and ordinary meaning.

"The quoted language of the invoice

COURT DECISIONS

means that the resistors must be rejected for a cause and not arbitrarily and in the event of rejection the option is with the manufacturer first, to make the replacement and second, if there is no replacement, to refund the money paid.

"If the purchaser had found the resistors defective or imperfect it had the right to reject them and demand replacement or refund or it could confirm the agreement of purchase, waiving its rights and treating the goods as its own. It could not do both.

"Had it desired to reject the goods purchased for cause, it should have acted promptly and within a reasonable time after discovering that the resistors were defective or imperfect. Instead, the purchaser considered the resistors as its own property, dealt with them as such by having certain work done on them. The attempt to reject them came too late."

Employee's Secret Profits

The employee of a manufacturer of small metallic parts used in the electronic industry, was promoted to foreman and assigned the duty of research in the production of soldering fluxes.

A few years later this man told his employer that the flux the plant had been using was undesirable because of the harmful effect on the hands of the workmen and undertook the production of a soldering flux of his own composition in the plant and with the plant's facilities.

Shortly afterwards a sample of flux was received by the employer from another producer, found acceptable and used for three years by the manufacturer in place of the flux of their own make.

At the end of this period the employer learned that this foreman who had been in his employ for ten years, was a partner of the company producing the flux that had been thus recommended in the manufacture of these electronic parts and that the sales for this period, aggregating $35,772.29, represented a net profit to this employee and his partner of $25,908.11.

The manufacturer sued both the employee and his partner for damages for their exploitation of the confidential position of this employee and for an accounting of the monies acquired by them through this conspiracy.

In a decision, the New York court said, in awarding a judgment against this employee and his co-conspirator, that an employee who had proved faithless to a trust imposed in him by his employer cannot reap the benefits of his misconduct and must not only account for all his profits but forfeit any right he otherwise would have to compensation for his services.

"No man can serve two masters with equal fidelity when rival interests come into existence," said the court in conclusion. "Employees are bound at all times to exercise the utmost good faith and must act in accordance with highest principles."

Failure to Warn

An employee of a Michigan manufacturing plant was directed for the first time to scrape and clean a stack. In cleaning this stack, the soot and ashes were first removed with a short handled shovel through a door from the outside of the building and leading to the base of the stack. In order to take the ashes from the far side of the stack and beyond the reach of this short shovel it was necessary to use a scoop or hoe with a 12 ft iron handle.

Opposite and about 4½ ft from the stack door was an 8 ft brick wall, and on the other side of the wall three electric transformers which were not visible from the door.

No one had warned this employee of these transformers and in taking the ashes from the far side of the stack he pushed this 12 ft hoe beyond the brick wall into contact with the transformers. The iron handle of the hoe was still charged with electricity when other employees found this man dead a short time afterwards.

The suit for damages against the employer for failure to give the workman proper warning of this danger was decided against the company. In sustaining the judgment on appeal the Michigan Supreme Court said of the employer's liability under circumstances of this character, that the employee had a right to assume that it was safe to proceed as he did in cleaning this stack. The company was obliged to furnish its employees with a reasonably safe place in which to work, with suitable machinery or appliances and reasonably safe materials. Failing to do so, the employer was liable in damages for the consequences.

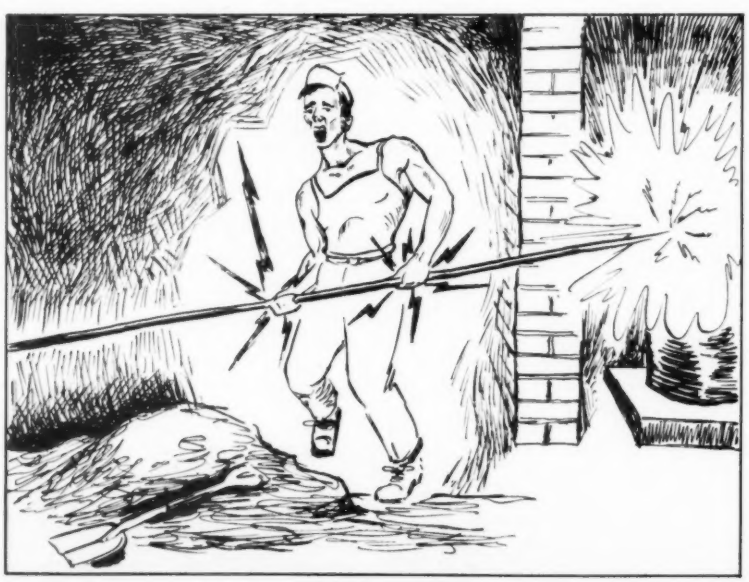
Employment Contract Void

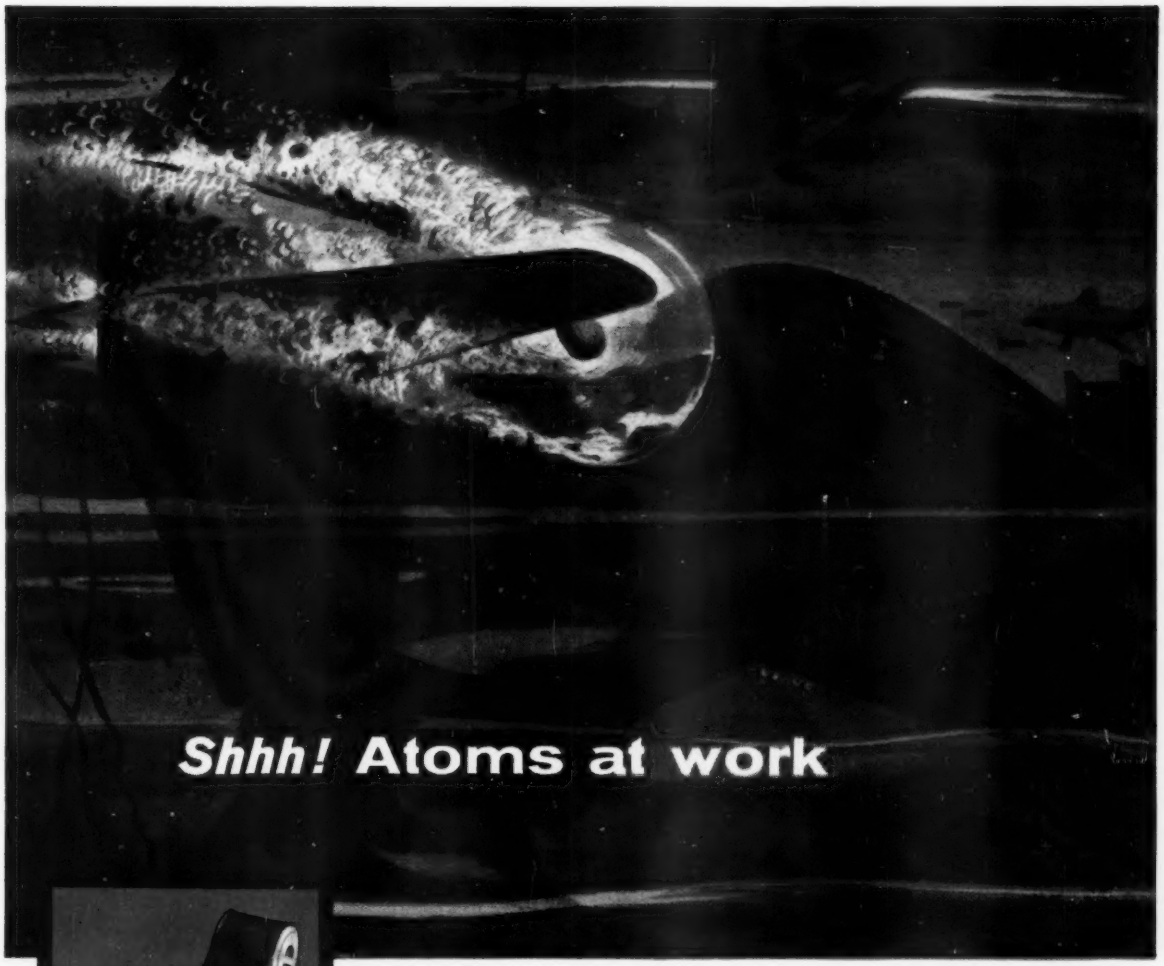
The employment contract of an Ohio manufacturer stipulated that during the life of the agreement and for a period of 10 years after its termination the employee should not be employed by any competitor of this employer in any territory in which its product was sold.

Two years later this employee left to accept a position with a competing company and the former employer then applied to an Ohio court for an order forbidding the employee from working for this competitor.

The court refused to interfere or to grant the order asked by the employer, asserting that restraint such as that set out in this agreement was illegal and harmful to the public except when it appeared that the employee had diverted the customers of a former employer or divulged his trade secrets.

"This employing company," said the court, "in its anxiety to protect itself stretched the covenant of this employment contract beyond the legal realm recognized by the law, creating a fatal defect that it was made to apply not only to the entire state of Ohio but also to other states as well."





NOT ONLY is the U.S.S. Nautilus the first submarine to be propelled by atomic power! She is also by far the most silent in operation . . . and therefore most difficult to locate by enemy sound-detecting devices and acoustic torpedoes.

To match the uncanny silence of her nuclear-generated-steam turbines, her builders* have wisely employed Gilmer "TIMING" BELTS for certain drives. Since it is the only type of drive that can transmit power at a constant angular velocity *without metal-to-metal contact*, the "TIMING" BELT was a "natural" for tachometer drives and various control drives requiring non-slip operation or accurate calibration.

*ELECTRIC BOAT DIVISION
OF GENERAL DYNAMICS CORPORATION

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Vertical delivery units come in 14 sizes with a choice of 4 easily attached deflectors. Five horizontal models are designed specifically for hot water. Five power throw models are also available.

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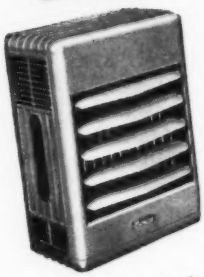

Only Modine gas-fired unit heaters have stainless steel burners and a choice of stainless or aluminized steel heat exchangers. Seven sizes—25,000 to 220,000 Btu. A.G.A. and C.G.A. approved for natural, mixed, manufactured, LP and LP-air gases.

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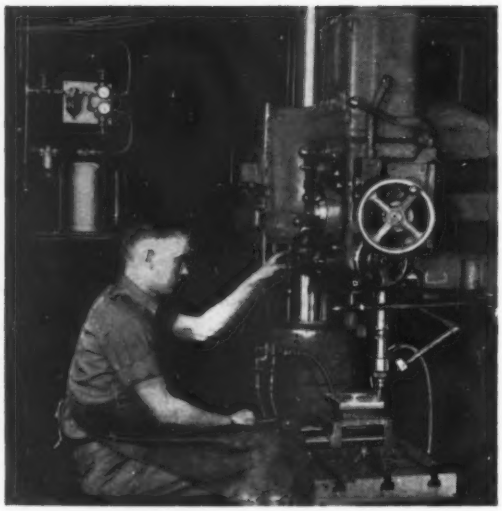

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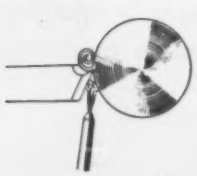

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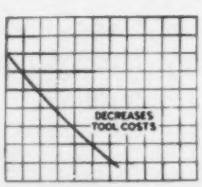

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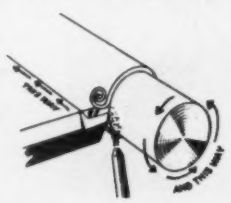

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RCA

A Manual of Methods

pre-planning . . .

McCaw and Sleeter view scale model of project

Frank Sleeter

Mr. Sleeter, a graduate of Chicago Technical College, was employed by Montgomery-Ward as head of the Construction and Equipment Department, until World War II.

Mr. Sleeter joined RCA in February, 1946, as Director of Plant Engineering. On April 2, 1954, he was promoted to Vice-Pres., Facilities Administration.

Robert F. McCaw

Mr. McCaw is Manager, Planning-Facilities Administration. A graduate of Missouri School of Mines, he was formerly General Plant Engineer with General Cable Corp., and came to RCA in 1946.

P. E. Yeager

Mr. Yeager received his education from the University of Pennsylvania and Drexel Institute. For the past 20 years, he has directed management operation, and construction of office and industrial buildings.

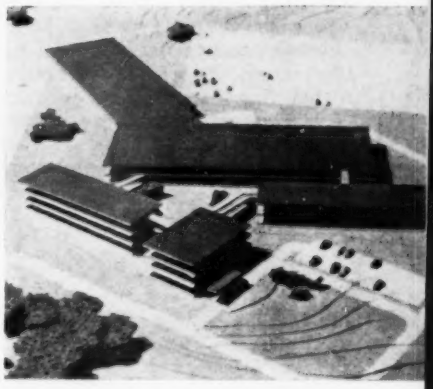
He came to RCA this year for the specific position of Plant Engineer at the Cherry Hill Project.

an Office Building Project

THIS IS THE story of how one company planned, designed, and is building a new home for the "headquarters groups" of two of its divisions. These groups include administrative, purchasing, advertising, financial, payroll, design, and engineering functions.

The company involved in this story is Radio Corporation of America. The locale is near Camden, New Jersey; the two groups are the RCA Victor Television Division and the RCA Service Company. The first group designs, builds and sells television sets; the latter group services and installs company equipment.

A new "home" was needed because both groups had long since become overcrowded in their existing quarters, and could not continue to operate with any degree of efficiency. For years, both groups have been housed in old multistoried buildings, which were originally designed for production. There was no room for expansion, no parking facilities; also, the cost or rehabilitating the old structures would have been prohibitive. Obviously, the need for new facilities was urgent; however, the price-tag would be high, and top management had to be completely sold on such a project. This is where the story begins.



Close-up view of five RCA buildings

Value of Pre-planning by Owner

THE PROBLEM was placed in the hands of the "Facilities Administration" group. This department is responsible for all Plant Engineering staff functions, including the planning and execution of all construction projects.

Unlike some companies, the Facilities Administration does not maintain a staff of architects, engineers, and draftsmen. Instead of this, full use of outside specialists is made for the development of projects planned in the department. A large list of these specialists is kept on file, and rated according to their specialization and record of past performance.

When this project was first conceived, it was apparent that no ordinary project was in the making. The company had designed and built a number of new plants and warehouses in previous years, but this was the first time a major office building project had been tackled.

Obviously, it called for much research into the office-building field. And, applying the valuable lessons learned in plant-design, it was imperative that a great deal of pre-planning had to be accomplished by the owner, before the job could reasonably be turned over to architects and design engineers. (The results of this research — in advance — by the owner, were so profitable that this point cannot be overstressed.)

The value of pre-planning was demonstrated most clearly in handling construction contract bids.

summary

Building Unit Costs, as Follows*

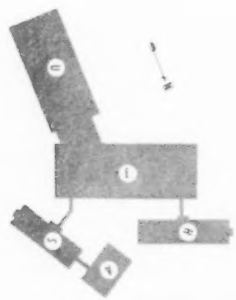
Average cost per sq ft of all buildings	$10.12
Average cost per sq ft of office buildings	13.65
Average cost per sq ft of laboratory building	8.20
Average cost per sq ft of Utility (shop) building	7.30
Average cost per sq ft—electrical system	1.18
Average cost per sq ft—air-conditioning system	1.83
Average cost per sq ft—outside facilities	1.18
Average cost per sq ft—total project	14.20

*Exclusive of land

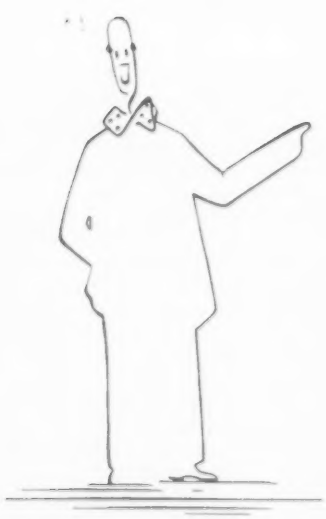
FROM ALL INDICATIONS, the end result will be a combination of beauty, efficiency, comfort, and low cost.

An attempt was made to inject into this project all worthwhile new ideas that were economically possible. Buildings were oriented to take best advantage of the site and surrounding terrain. Every thought was given to the comfort of employees; flexibility was the objective in all phases of design; and lower maintenance was expected from the use of the materials selected.

As the project was one to house administrative and engineering functions, the complete cost of owning (and operating) the buildings was considered as "overhead" expense. Therefore, it was necessary to design for the low costs shown at left.



By comparison with today's costs in office and lab building designs, it is apparent that this project has come in at figures well below the going rates. This should be of great interest to other companies contemplating similar building programs.



Summarizing Salient Points

SUMMARIZING THE salient points which contributed the most in producing a project of this type at low cost, we find these:

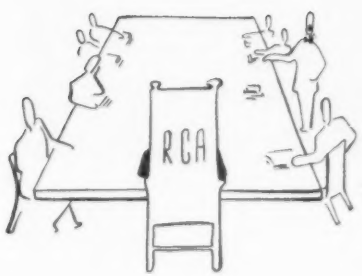
1. Research, by the owner, in new materials, designs and techniques.
2. Thorough study of functions and work flow, and then complete floor layouts—before building sizes are determined.
3. Design of a simplified electrical system.
4. An air conditioning system which utilizes simple ductwork and a minimum of equipment.
5. Installation of building mechanical equipment in low-cost penthouses, instead of expensive floor space below.
6. Use of Lift-Slab structures.
7. Minimum number of storm water drains from roofs.
8. Use of standardized steel frame for shop building.
9. Elimination of hung ceilings.
10. Minimum amount of painting.
11. Use of "package" boilers.
12. Minimum use of plaster.
13. Elimination of ceiling-high masonry walls where possible.
14. Use of prefabricated components.
15. Selection and use of good consultants, engineers, and experts when needed.
16. A carefully prepared set of plans and specifications.
17. Selective bidding.
18. A good architect—one who specializes in the type of buildings required. (In this case, Vincent G. Kling, Philadelphia.)
19. Good cost-control.
20. Use of movable partitions wherever possible.

What Plant Engineering Did:

The list of items predetermined and pre-planned by the owner was as follows . . .

1. Number and types of buildings.
2. Sizes of buildings, and number of floors in each.
3. Types of structures and floor loadings. (Lift-Slab specified for office buildings, and prefab steel frame for the Utility Building.)
4. Size and locations of stairs, toilets, elevators and entrances.
5. Complete floor plans of all buildings.
6. Determination of electrical, heating, and air conditioning loads.
7. Type of electrical distribution system and materials desired.
8. Type of boilers.
9. Selection of lighting fixtures, floor-coverings, general office partitions, glazing, toilet fixtures, fire-protection, underfloor duct system, telephone equipment, water coolers, office furniture, cafeterias and kitchen equipment, steam traps and valves, and miscellaneous items of standardized equipment.

USE OF CONSULTANTS



THROUGHOUT THE planning stage, the company called upon outside experts or consultants—to help guide the design. For instance, in the study of Lift-Slab[1], a prominent area structural designer was employed to make cost studies, and to check the practicability of the system. In fact, his assignment was to "find out everything wrong with the system." The planners were convinced that it was a good system, but they wanted to find all of the complications that had to be dealt with.

The Shaw Walker Planning Division prepared recommendations for items 1, 2 and 5, above.

A nationally-known electrical engineer, at the University of Pennsylvania, was assigned to the lighting studies, and acted as a consultant on the power distribution.

As the site was without water and sewer facilities, outside engineering firms were used to make studies and recommendations on these two utilities.

Several manufacturers' research laboratories were visited, in the studies of floor-coverings, plastic materials, etc.

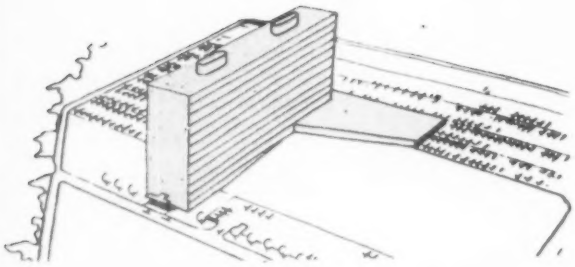
In the design and selection of the porcelain grid wall system, a prominent New York architect, I. M. Pei, was employed as a consultant.

All of the consultants used in this project proved their value in tangible, measurable ways. They took most of the "gamble" out of the calculated risks which the company had to take, to produce quality buildings at reasonably low cost.

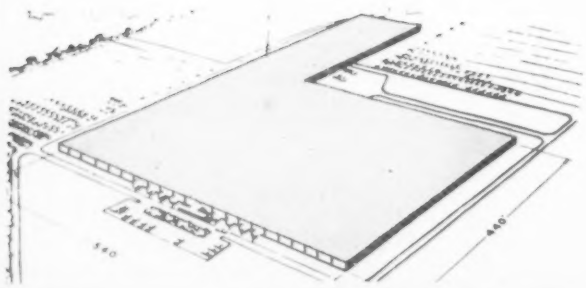
These are a few of the phases in which consultants, or experts, were used. Their advice was sought to guide the company's planning. To this wealth of information was added the experience Facilities Administration gained on previous construction projects. It has been long recognized by the company that owners are too often inclined to place the full responsibility of planning new facilities into the hands of an outside company, without much pre-planning by its own people. And, that, with all due respect to outside engineers and architects, they could not be expected to select every feature of design which was best for the owner.

With this premise in mind, all possible research was done in advance of the selection of the architect-engineer to handle the project. It should be understood that this is in no way a reflection on the integrity or ability of any firm; rather, it is a scheme whereby the owner can predetermine certain features which are desired in the new construction. And, in formulating opinions on design details, the company used many outside experts. The architect, Vincent G. Kling, did a splendid job of incorporating the owner's ideas into a beautiful modern group of buildings, which added another architectural award to his growing list.

[1] Lift-Slab is a copyrighted trademark of United States Lift Slab Corporation.



EVOLUTION TO A 5-BUILDING PLAN



IT IS USUALLY assumed that one building is the most economical way of housing office and laboratory functions; or two buildings, at most. In this case, five buildings were planned, after preliminary research and planning dictated their use. As shown in the portfolio of sketches presented to management, several alternate plans were studied:

A. The large, one-story, single building. While such a building has become the accepted standard for most industrial plants, it is not necessarily suitable for office and laboratory use. Some of the reasons are shown on the sketch.

B. A single, multi-storied building was also studied. (This presented problems of vertical transportation, noisy operations in same building with offices, etc.) Neither of these types suited the project under discussion, for many reasons.

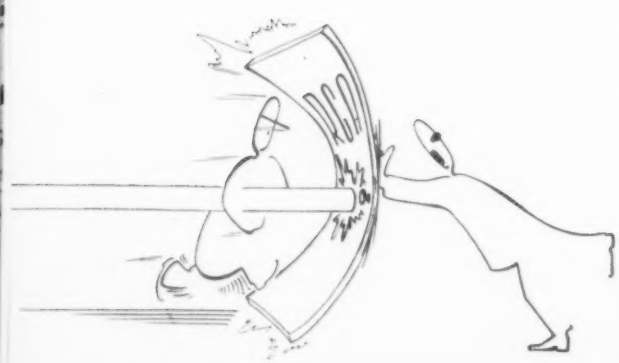
First, there were three types of functions involved:—(a) Office and Administrative, (b) Engineering and Laboratory, and (c) Shop or Utility space. Next, because two company divisions were involved, it was desirable to segregate their operations physically. Finally, to eliminate the need for private executive offices throughout the buildings, it was decided to concentrate the top staff executive offices in one small building, along with other special functions such as display room, reception center, personnel, etc. This permitted the office buildings to be a strictly functional design, without fixed masonry walls, etc. Complete flexibility could, therefore, be designed into these buildings.

Next, there were a number of noisy, or dirty operations which could (and should) go into low-cost space. For instance:—boiler and compressor room, storage space, wood-working model shop, metal model shop, pilot assembly shop, life-test labs, etc.

Also, a fifth building was set up to house engineering, laboratories, cafeteria, machine accounting, and miscellaneous functions which rightfully belonged in first quality space, and which would be common to both office divisions.

Several different views of the scale models that make up the five building Cherry Hill Project are illustrated above

METHODS OF BIDDING

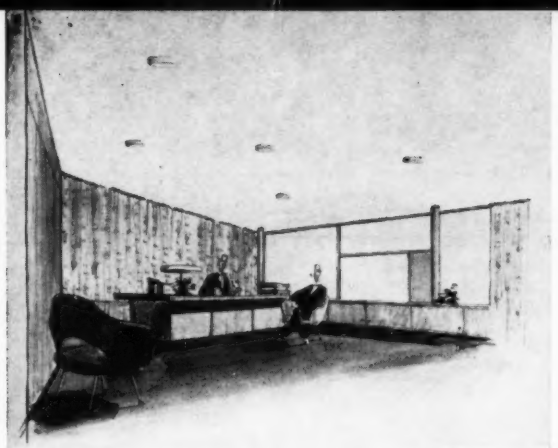


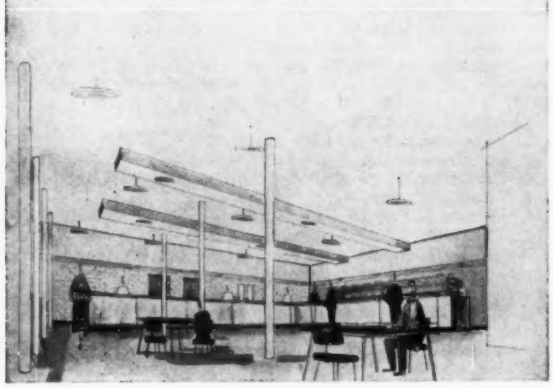
HAVING DONE construction work under all of the present-day schemes, the company was fully aware of the benefits and pitfalls of each type of contract. The "cost-plus-a-fixed-fee" method would have expedited the job; however, a very tight budget control had to be maintained, so this method was eliminated.

To avoid pending price increases, certain items of equipment were ordered in advance by the owner. And, to have closer selection in other items of equipment which had not been stabilized, the owner finally elected to take separate sub-contract bids on electrical, plumbing, heating and air-conditioning, and sprinkler facilities. Also, to save time, and gain settlement and compaction, a rough-grading contract was let—well in advance of the general contract awards.

Knowing that the most satisfactory method of prosecuting a job this size was to have it all under one contract, the company asked each general contractor to stipulate a fixed fee for which he would assume the full responsibility of coordinating all sub-contracts under one general contract.

The bidding list was carefully selected, and bids were taken for general, electrical, plumbing, air conditioning, and sprinkler contracts. Then, an analysis of all bids was made, and one "package-deal" bid was awarded to the low bidder. (The successful bidder was one of the major construction firms, with years of experience in building top quality office structures.)





BASIC CONCEPTS

A. that no employee should be more than 35 ft from windows;

B. that no person had to travel more than 120 ft to washrooms;

C. that supervisory offices would be in interior space;

D. that employees would not have to walk up more than one story; and

E. that there would be no cross-traffic through departments.

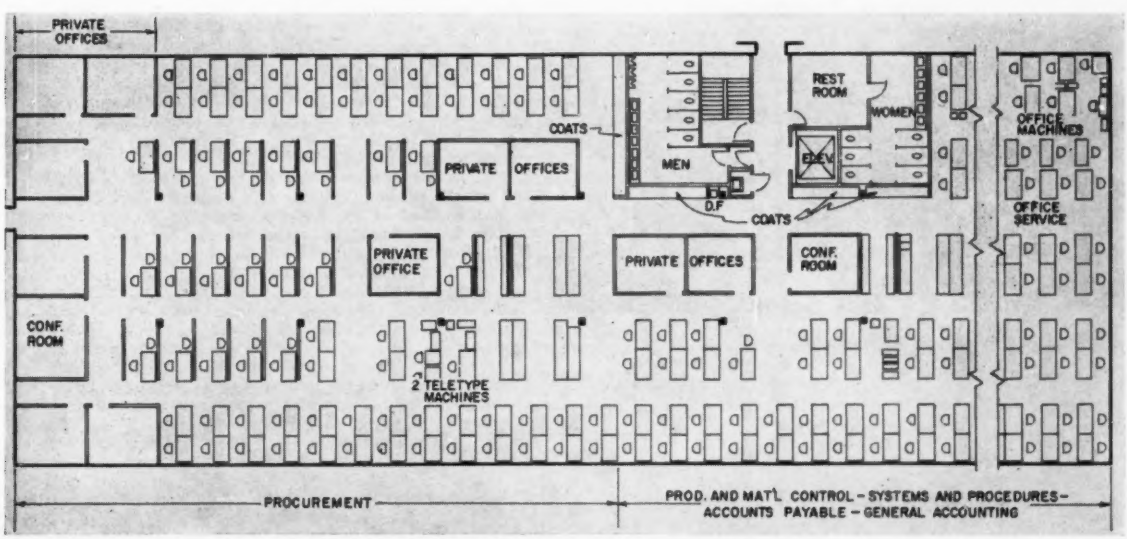
THE COMPANY realized its limited experience in office planning, so a search was made for experts in this field. The Planning Division of the Shaw-Walker Co., under the direction of R. K. Gad, was commissioned to do this work. This group specializes in office procedures, work-flow studies, and office layouts. It was given only a minimum of directives from the company:

1. Each of the two company divisions was to have separate office facilities.
2. There was to be one area confined to engineering offices and laboratory.
3. There was to be a low-cost Utility Building—to house boilers, compressors, shops, storage, etc.
4. Cafeteria and other facilities were to be common to both groups.
5. There was to be a "restricted area" for government work.

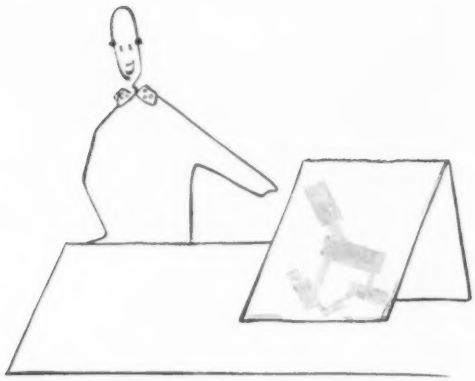
Armed only with these restrictions, this group went to work; to study every activity involved, coordinate all functions into the proper scheme of things, make all floor layouts of furniture and equipment, and finally, to sell the owner on their conclusions and recommendations. This work was prosecuted rapidly, and tentative detailed layouts were developed.

In the layouts, the basic concepts listed above were followed. Adhering strictly to these "ground-rules," the Shaw-Walker group finally presented layouts which most completely filled the requirements. Naturally, there was no perfect solution to every problem; however, there were practically no objectionable features in the final layouts.

Next came the problem of selling the layouts to management. This was purposely done at high level first. Large size private offices—always wasteful of floor space—had to be dispensed with. Ceiling-high partitions were eliminated, also, except in those few instances where complete privacy was absolutely essential. (Numerous small conference rooms were provided to alleviate the need for conference space in supervisory offices.) After top management had approved the layouts, in general, each supervisor was contacted on his particular group layout. Details were agreed upon, and final layouts were made.



Sketch of floor planning, done by Shaw-Walker, shows how problems in circulation were solved in order to conform to basic concepts of floor layout set down earlier by plant engineering at RCA described in portion of article directly above



Selling the Project to Management

Intangibles . . .

IN THE INITIAL STAGE, this project had to be justified, the same as any other. Being an office and laboratory venture, the "selling" was more difficult than for a plant, or any other type of project which has a profit story to support the cash outlay for construction. Intangibles, such as: less turnover in personnel, better working conditions, better office efficiency, etc., are always hard to sell to management. This project was no exception, except that it carried the added weight of a recognized need for more space.

Special Book Prepared . . .

The justification for the project was carefully prepared in narrative and graphic format, for presentation to top management. A special book was prepared, showing these angles:

1. **A brief explanation of the project.**
2. **Photographs of existing quarters.**
3. **Solutions to the problem.**
4. **Cost studies; new construction versus rehabilitation.**
5. **Suggested plan.**
6. **Estimate of cost.**
7. **Time schedule, advantages, etc.**

A few extra dollars were spent in preparation of this book, on the theory that busy executives do not have time to read lengthy reports; and that such a project should logically be sold in the same manner as any other commodity. This book contained sketches of several plans, to show that more than one scheme had been considered. The final summary recommended one plan, and one price-tag. This book supported the formal request for funds, and was circulated in top management.

Second Presentation . . .

After the official approval was granted, and the design took on a fixed pattern, a second presentation was made—to stabilize, and justify, the design features. In this presentation, some of the proven sales and promotion "gimmicks" were used; again, to tell a story in graphic form—concisely and convincingly. A large, ring-binder, desk-type easel was prepared—portraying a short, condensed story of the job; and explaining why the selected design features had been used. This brochure explained in simple language the following points:

Brochure Explained . . .

1. **The why—when—where of the project.**
2. **Designs studied, and the one decided upon.**
3. **Explanation of the five-building plan.**
4. **The unique features in the design.**
5. **A simple story on efficiency.**
6. **Plot plan, statistical data, etc.**
7. **A time schedule.**

This Sales Tool . . .

This "sales-tool" used some simple art work and a legible job of printing to dramatize the project. It did a very good job of telling a story which would have required many pages if contained in a routine report.

Later, when plans and specifications had been resolved, several conferences were held in which actual materials, and architects renderings, were used to portray more clearly the finished product. This demonstration was repeated several times to the lower echelon of management, simply to acquaint the "tenants" with what the planners held in store for their new quarters.

Acquaints All Levels . . .

This presentation by the Facilities Administration group, and the architect, was used for the purpose of acquainting all levels of management with a project which incorporated many so-called "unorthodox" features: departures from the accepted standards of the day.

THE "EASEL" PRESENTATION

OUR METHOD OF APPROACH TO THE PROBLEM

FIRST we made the most efficient layout

THEN we "wrapped" the building around it

1

PLANNED BY A TEAM OF EXPERTS

To attain these results, some of the country's best engineers, designers and architects were enlisted to form a design and construction team of outstanding ability and broad background of experience.

Here are a few of the members:

2

• OFFICE PLANNING SPECIALISTS of Shaw Walker Company.....This group of nationally-recognized layout experts has planned office buildings for some of the country's leading corporations.

• VINCENT G. KLING.....architect..... prominent Philadelphia designer known for his outstanding designs in institutional, office and laboratory structures.

3

• I. M. PEI ...an outstanding architect, known for his low-cost office designs...our consultant on architectural design and materials.

• FRED SEVERUD...of inter-nationally known firm of Severud, Elstad & Krueger...Severud is a recognized authority in the field of structural design...particularly in reinforced concrete construction.

4

• FRED LANCE...Director of Institute of Inventive Research...consultant on "lift-slab" construction methods.

• R. J. SIGEL...air-conditioning engineer...of wide experience.

• DR. C. D. FAWCETT...University of Pennsylvania lighting expert...consultant on electrical and power designs.

5

• LOUIS T. KLAUDER ASSOCIATES... Mechanical and electrical consultants... one of the oldest names in architectural-engineering work in the East.

• MALCOLM WELLS... Architect and designer...our regular staff consultant on all work in this field.

• Plus our own Staff in General Plant Engineering.

6

TEAM WORK PAID OFF!

Careful planning...intensive research... investigation into materials and techniques... resulted in a design that best meets the requirements of efficient layout and good architectural treatment.

Various designs and layouts were considered.

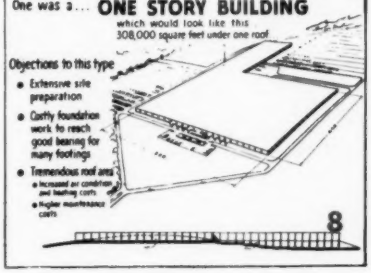
7

One was a... **ONE STORY BUILDING**

which would look like this
308,000 square feet under one roof

Objections to this type

- Extensive site preparation
- Costly foundation work to reach good bearing for many footings
- Tremendous roof area
  - Increased air conditioning and heating costs
  - Higher maintenance costs



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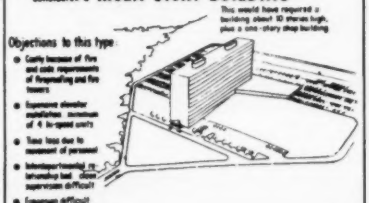
...then, the team considered a **MULTI-STORY BUILDING**

This would have required a building about 10 stories high, plus a one-story shop building

Objections to this type

- Costly because of fire and code requirements of fireproofing and fire towers
- Expensive elevator installation - minimum of 4 hi-speed units
- Time loss due to movement of personnel
- Interdepartmental relationship bad - close supervision difficult
- Expansion difficult



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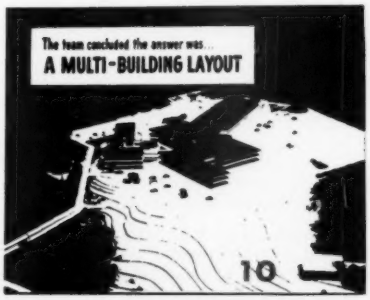
The team concluded the answer was...

A MULTI-BUILDING LAYOUT



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Favorable considerations--Multi-Building Layout

- Minimum site preparation
  Floor levels varied to suit grade
- Minimum length of mechanical runouts
- Separate office quarters for two divisions
- Engineering building common to both activities
- Separate, restricted area for government work

12

WHAT ARE THE FIVE BUILDINGS?		
1. Administrative	3 floors	31,000 sq. ft.
2. Service Company Office	3 floors	44,000 sq. ft.
3. Home Instrument Office	2 floors	36,000 sq. ft.
4. Engineering	2 floors	132,000 sq. ft.
5. Shop and Warehouse	2 floors	50,000 sq. ft.
Total working area -		293,000 sq. ft.
Space for Building Services -		15,000 sq. ft.
Total project area -		308,000 sq. ft.

11

- Scientific office layout reduces vertical and long-run traffic to minimum
- Buildings and entrances planned for no more than one-floor "walk-up"
- Eliminates need of passenger elevators
- Escalators considered... traffic load does not justify cost
- Small service elevators are automatic

13

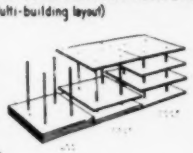
- Windowless areas minimized
- Pleasant working conditions
- No desk more than 35 feet from a window
- Special treatment for executive, showroom-museum, reception and personnel functions in separate building

14

UNIQUE DESIGN and CONSTRUCTION FEATURE

(Multi-building layout)

- Lift-slab method of construction
  - Speedier construction
  - Eliminates costly suspended ceilings
  - Saves steel tonnage



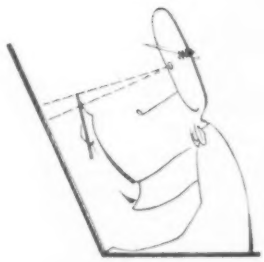
15

building planning

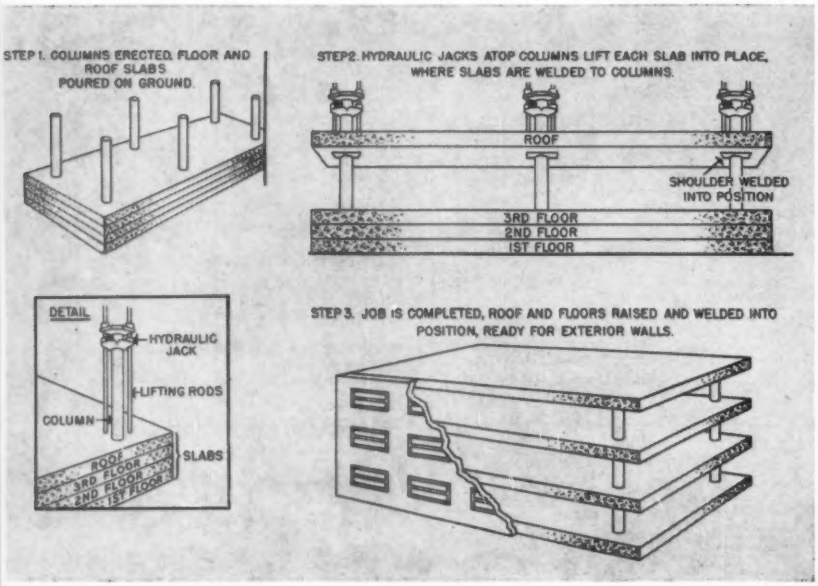
PRIOR TO—and concurrently with—the layout studies, design research was going full blast in the Facilities Administration. The company had these principal objectives in design:

1. **Clean, air conditioned space.**
2. **Quality lighting.**
3. **Good acoustical treatment.**
4. **Low-maintenance buildings.**
5. **Modern architecture and styling.**
6. **Efficient layouts.**
7. **Reasonable cost.**

Economic studies had previously determined a "target" budget on the job; this, incidentally, was a very conservative one. To attain such a goal meant that every possible advantage must be taken of cost-saving materials and techniques.



. . . Lift-Slab Method


STEP 1. COLUMNS ERECTED. FLOOR AND ROOF SLABS POURED ON GROUND.
STEP 2. HYDRAULIC JACKS ATOP COLUMNS LIFT EACH SLAB INTO PLACE, WHERE SLABS ARE WELDED TO COLUMNS.
ROOF
SHOULDER WELDED INTO POSITION
3RD FLOOR
2ND FLOOR
1ST FLOOR
DETAIL
HYDRAULIC JACK
LIFTING RODS
COLUMN
SLABS
ROOF
3RD FLOOR
2ND FLOOR
1ST FLOOR
STEP 3. JOB IS COMPLETED, ROOF AND FLOORS RAISED AND WELDED INTO POSITION, READY FOR EXTERIOR WALLS.

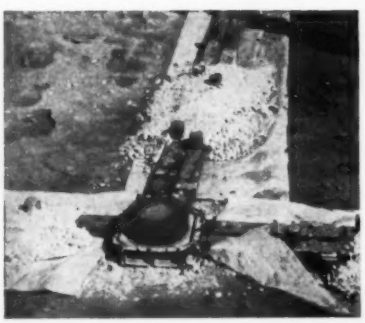
FOR MANY months, the company's planning group had searched for, and found, many materials, techniques, and ideas, which all tended to lower first cost, maintenance cost, or both. Notably important on this list was the now-famous "Youtz-Slick Lift-Slab method of construction."

(This system provides for the casting of all floor and roof slabs on the ground, stacked one on top of the other. Then, each slab is, in turn, raised to its ultimate position by a set of hydraulic jacks onto the top of each steel column.)

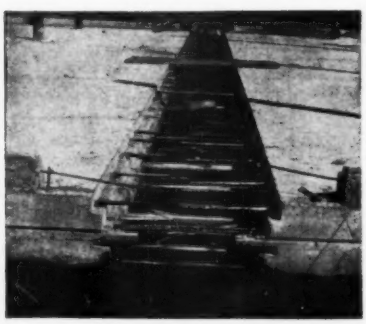
The Lift-Slab method presents many cost-savers, which are, at first, not apparent. Structurally, there is an immediate cost-savings, due to the omission of floor-to-floor forming costs. Next, the time of construction is "paced" by the Lift-Slab, so that the overall length of time is shortened, reducing costs.

In order to reap the savings possible with the Lift-Slab method, the company arranged to show a complete movie film of the process to all of the bidding contractors. This was done immediately after the invitations to bid were sent out. In this manner, the company hoped to (and did) realize a savings.

Early general view of Cherry Hill project showing the workmen preparing underfloor construction before the ground floor concrete slab is laid over duct



One reason why Lift-Slab construction is able to show savings is advance work that is possible. Shown here is close-up of one of the underfloor duct units



This "pour-strip" is left so that floor will be divided into sections that can be lifted by 24 jacks. Concrete will be poured here after slabs are in place

Save Time, Save Money

Maintenance-Free Materials

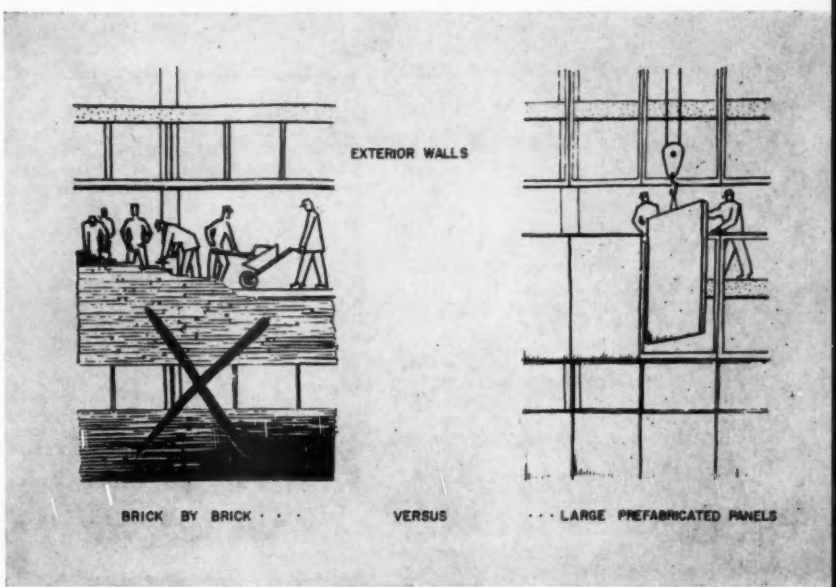
IN ITS SEARCH for maintenance-free materials, the company had done a lot of research on pre-fabricated wall sections. In this category, these materials were investigated:

A. Precast concrete panels.
B. Hollow-glazed tile.
C. Light-weight "gaseous-concrete" sections.
D. "Sandwich panels," using:
   1. Aluminum;
   2. Stainless steel;
   3. Bronze;
   4. Porcelain on steel;
   5. Porcelain on aluminum;
   6. Glass, marble, and stone;
   7. Asbestos concrete; and
   8. Plastics.

All possible history on "grid-panel" walls was collected; fabricators were consulted; architects who have had experience in the field contributed valuable help; and again, a consultant was employed to guide the company's thinking.

In attempting to obtain completely shop-fabricated panel wall modules, the planners urged fabricators to come up with something "new and different." On the premise that sash manufacturers had the know-how for such work, one major manufacturer was encouraged to design and fabricate a sample panel. (The results were most gratifying, and the average cost per square foot was low enough to be startling. Although this particular panel was not used, the manufacturer thought enough of his creation to decide on marketing it as a standard trade item.)

In the study of porcelain panels, the company sought the guidance of the Porcelain Enamel Institute, of which it is a member. Also, technical data on porcelain, for use on aluminum, was obtained from its originator, the Du Pont Co. Information concerning precast concrete panels was obtained from the Portland Cement Association, and leading manufacturers. Full data were obtained on the two existing "gaseous-concrete" casting processes: the Swedish and the British types. All known plastics panels were fully explored, from the glass fibre polyesters to the polyvinyl chlorides.



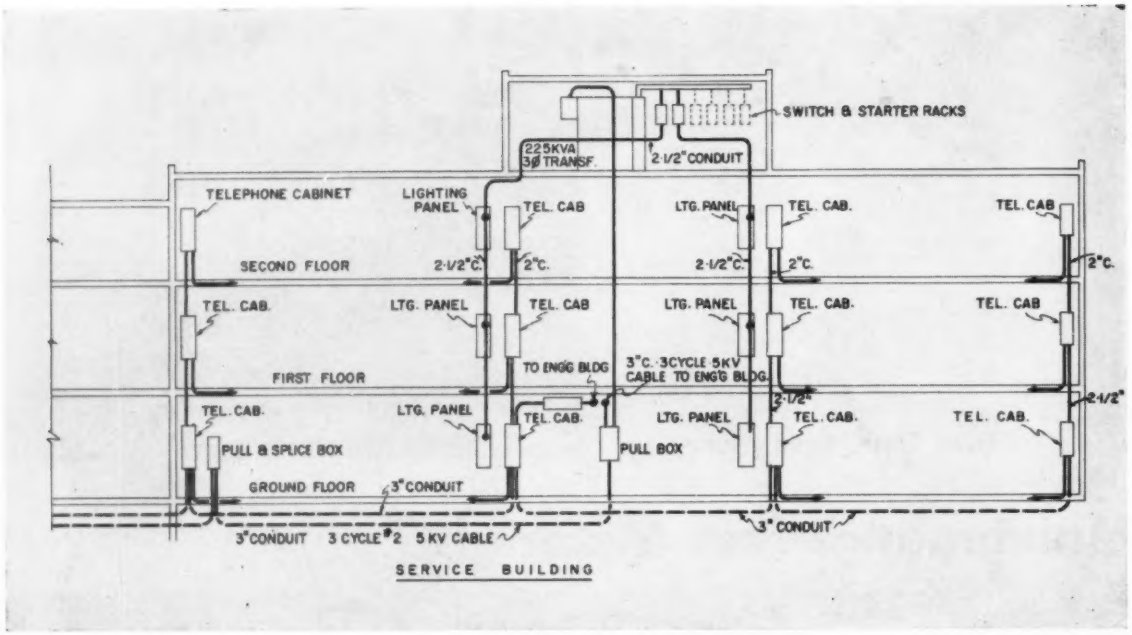
Investigation in the better known grid-panel "pioneers," such as Lever House, United Nations, General Motors Research Center, and others, showed that each and every project had its own peculiar design problems. Despite the great amount of research that had gone before, each of these grid-panel systems presented some problems which were not evident—or even anticipated—prior to installation. All such problems, and their solutions, were collected as part of this company's research.

Since some color was desired in the building panels, it appeared that porcelain was indicated. And, although porcelain on aluminum was new on the market, years of experience had proved the satisfactory performance of porcelain on steel. Also, to attain the desired architectural effect, large size 4- by 8-ft panels were required.

Experience had shown that in panels of this size, a considerable waviness—or "oil-canning"—could be expected. Therefore, some type of rigidity must be provided. Numerous designs were tried, with only a reasonable amount of success. Finally, it was decided to try vertical corrugations in the panel; small ones which would not present an unpleasant appearance. This proved to be highly satisfactory from both the architectural and mechanical viewpoints.

Condensation is also a major problem in the design of insulated panels. This was overcome by designing an air-space into the panel, and providing a continuous "weep" opening at the bottom.

All of the commonly used insulations



Power facilities for the service building, including lighting panels, transformer, switch and starter racks, allied equipment

were studied: honeycomb, kraft paper, glass fibre, rock wool, and Foamglas. The last one proved to be the best, because a rigid, inert, material was needed. This material was cemented to the inside face of the panel, which was flat. Then, the air space was left on the outside of the panel, see Fig. 16.

Finally, after months of digging, the planners settled on a system which consisted of a structural steel frame, covered with stainless steel sheet, to which was attached insulated porcelain panels and glare-reducing glass. This system provided these features: (1) maintenance-free exterior and interior; (2) modern architectural treatment; (3) color selection; (4) good thermal insulation; (5) glare-reduction in solar radiation; (6) rapid installation; and (7) reasonable cost.

After the insulated panels had been developed, and the framing system designed, the vendors ran tests to simulate actual conditions which would be encountered after the buildings were completed. These tests consisted of wind-loading, water leakage, and heat transmission. The panels withstood 50 mph winds, and driving rains, without any undesirable results. The heat-loss tests showed a U-factor of between 0.15 and 0.20.

Roof drainage came in for some extra study, also. To avoid the furring-out of the small round steel columns, it was decided to pitch the roofs toward roof drain stacks located in the vertical "utility cores." These cores enclosed stairs, elevators, toilets, electric cables, air ducts, heating, and plumbing piping, etc.

Preliminary cost studies were made on all mechanical and electrical items. It was evident from these studies that the company would have to do something unconventional if low costs were to be realized. The original thinking followed the conventional pattern in electrical design: underground ducts and cables, manholes, primary and secondary switchgear, unit substations, etc. (This indicated an average cost of about $3.30 per square foot, for the whole project.)

Then, the company planners wrote the prescription for the simplest kind of electrical system considered practical for such a project. This system incorporated these features: (1) power supplied from the utility company at 4160 v, 3 phase, 60 cycles; (2) one main breaker—5000 v; (3) feeders of 5000 v, flexible armored cable; (4) feeders, running through buildings to roof penthouses, contained transformers and air-conditioning equipment; (5) simple oil fused disconnects (3 phase) used as transformer disconnects; (6) three phase, dry-type, transformers stepped the voltage down from 4160 to 115/208—3 phase—4 wire, for general use; (7) the distribution system served all lighting at 115 v, all small power at 208 v—either single, or three-phase; and (8) air conditioning compressor, 600 hp, was served at 4160 v.

It was fully realized by the planners that such a system would involve a "calculated risk" on the part of the company; however, it seemed reasonable that a temporary power outage expectance—due to a failure in the wiring and equipment—was no greater than one which might come from an external power line failure. Further, it was reasoned that certain risks could be taken in office design which could not be tolerated in plant planning. (As proof that this electrical system, though unconventional, drastically reduced the total project cost, it can be noted that the electrical contract was finally awarded at a cost of approximately $1.18 per square foot, as compared to an original estimate of $3.30.

Air conditioning was installed in all buildings except the "utility" or shop building. This was a central-type, chilled-water system. Here, again, a calculated risk was taken to reduce cost. Instead of the usual dual unit set-up, only one compressor was installed. The manufacturer had an efficient service shop in the area, and maintained 24-hour service for breakdowns. This fact minimized the "risk" in using only one unit. Also, the shutdown of air conditioning would not cause any great loss of production, since emergency window ventilators were provided for this purpose.

Conventional design would have provided machine rooms on the various floors—for the mechanical equipment. Such floor space is expensive; the company planners decided to use roof penthouses, instead, with the resultant savings in space—and cost.

The air conditioning system consisted of this equipment:

A. A single, 600 ton, centrifugal compressor—driven by a synchronous, 4160 v, three phase motor.

B. A chilled-water circulating system which pumped the water to each building penthouse.

C. A freon refrigeration cycle, with tanks, coils, and cooling tower; all located in the Utility Building.

D. Cooling coils, fans, filters, and controls—located in penthouses on each building.

E. Heat coils, to provide winter heating, in the penthouses; also, rows of finned connector radiation around the perimeter of each building.

To obtain low cost in the Utility Building, a prefabricated, standardized frame was used. This saved design costs, provided desirable bay sizes, and afforded speedy construction.

The feeding facilities were pre-determined by the company, also. Incorporated into these plans were a cafeteria-auditorium area, kitchen, and a private dining room with its separate serving center. (The services of a food service consultant were utilized here, under the direction of the company's expert on food service.)

Details of Project . . .

Administration Building

Three floors—33,000 sq ft—brick end walls—insulated porcelain panel grid system walls on two sides—actinic glass—asphalt tile floor covering in general areas—carpeting in executive offices—fluorescent and incandescent lighting—air conditioned—acoustical tile on ceilings—special decorative treatment in reception and display areas—underfloor telephone, electrical, and antennae ducts.

The Two Office Buildings

These two buildings are identical in treatment; are the same width, and roughly the same length. However, one consists of two stories, while the other is a three-story construction. They have: brick end walls, porcelain grid system walls front and back, actinic glass, asphalt tile floor covering, fluorescent slimline lighting, air conditioning, acoustical ceilings, underfloor ducts, and service elevators. Both are connected to the Administration Building by glass-enclosed bridges. Employee entrances are located midway in the rear sides of the buildings. Sizes: 36,000 and 44,000 sq ft.

Engineering Building

This is the largest building in the group—130,000 sq ft—two stories—with brick walls and aluminum sash. It, too, has air conditioning, fluorescent lighting, acoustical treatment, actinic glass, underfloor ducts, service elevator, etc. It is connected to the two office buildings by glass-enclosed bridges.

The entire top floor is occupied by engineering, design, drafting, and laboratory functions. As this is a design and testing "workshop" for use of electronic engineers and designers, it has its own special requirements. Design and drafting sections are placed around the perimeter of the building. All workbenches, test cages, test equipment, etc., are placed in a central area, and isolated by ceiling-high movable walls. This provides sound-isolation for noisy shop operations.

As nearly as possible, all design groups are directly opposite their lab functions. Air conditioning ducts are designed for flexibility, also. Provisions are made to serve test cages at any location on the floor. All possible equipment is of a completely portable design, to permit ready rearrangement of floor areas.

A completely flexible electrical system is provided through the use of Trol-E-Duct installed on the ceiling; served by a number of individual wall panels. All partitions in office areas are of the company's standard prefab design. None is ceiling high.

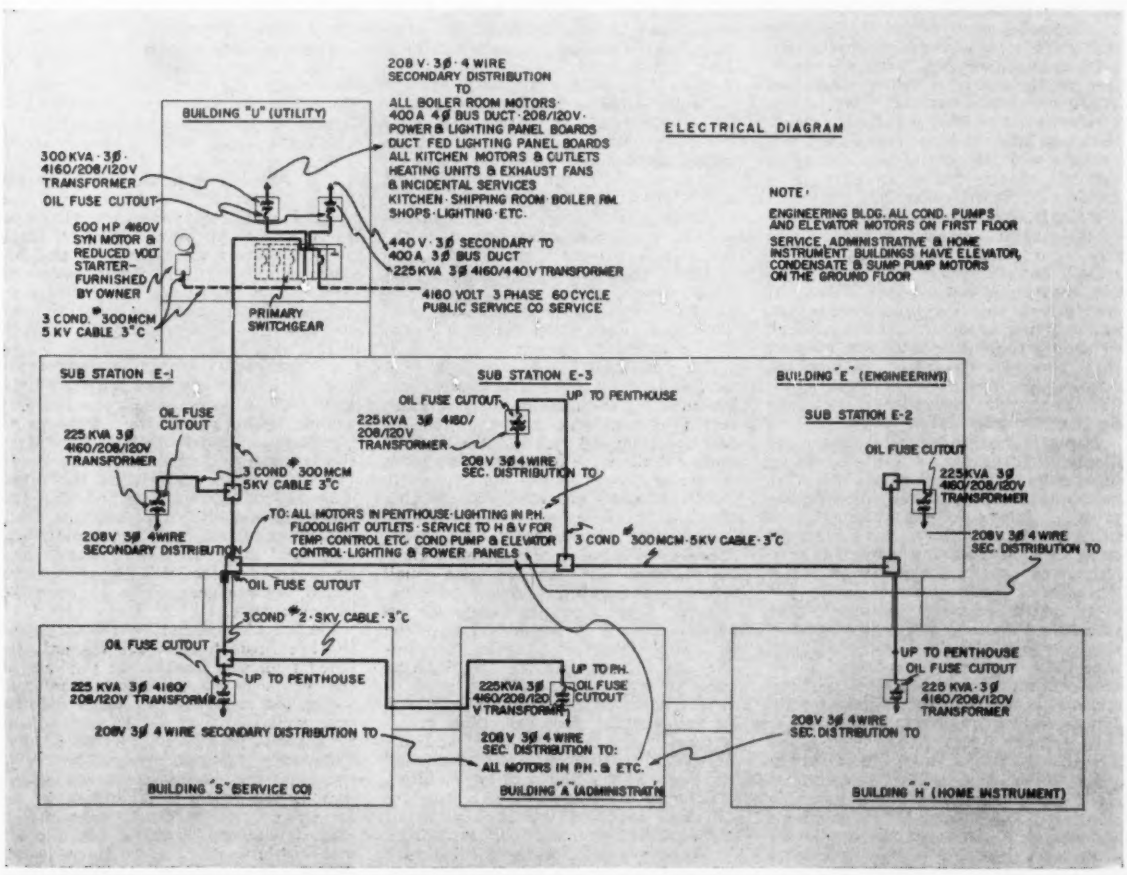
Every attempt was made to keep this department completely flexible in design. Only such items as stairs, elevators, and toilets are permanently installed.

Utility Building

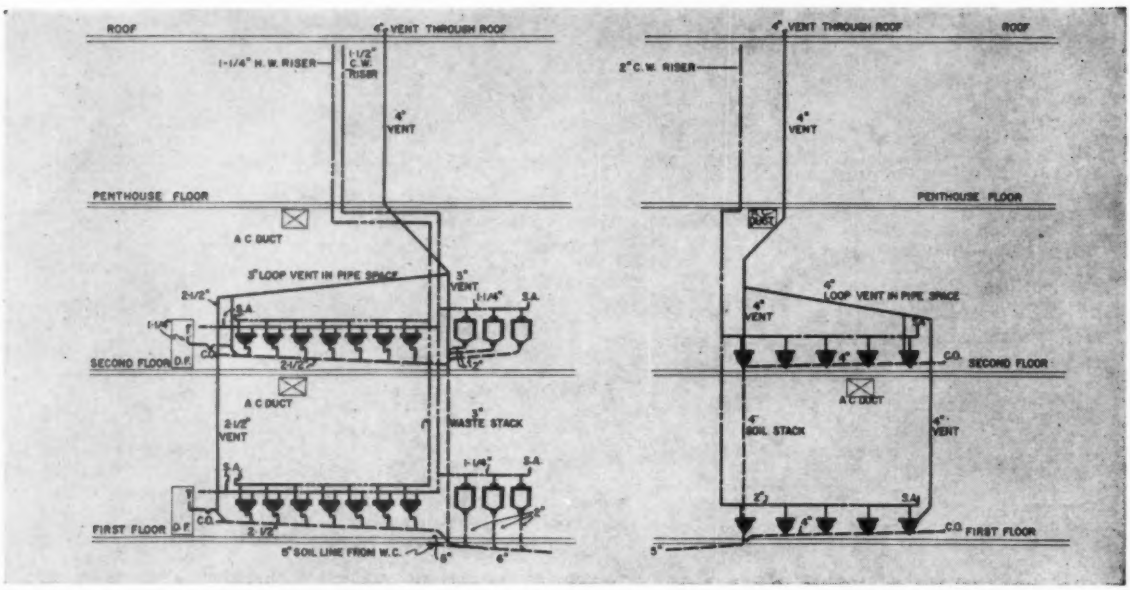
This building is a standard, "packaged" steel-frame building, with 30- by 30-ft bays, and 15-ft roof height. The roof is steel deck with rigid insulation and built-up roofing. Sidewalls are brick to sill height, steel sash, and insulated asbestos-cement panels make up the construction above the sash.

Building is approximately 50,000 sq ft in size, has conventional plant type lighting, heating, and power distribution. The floor is concrete, and the building is covered 100 per cent by sprinklers. Included in "building utilities" are boilers, refrigerator compressor, electrical primary breaker, air-compressor, and automatic telephone switching equipment.

No Basements: (Cost saver) Not required for functional reasons. The only facilities which are located below grade—under the buildings—are water, sewer, steam, condensate, and chilled-water lines; these do not require basements, and are run in insulated conduits. (Electrical cables are run overhead.)


ELECTRICAL DIAGRAM
NOTE:
ENGINEERING BLDG. ALL COND. PUMPS AND ELEVATOR MOTORS ON FIRST FLOOR
SERVICE, ADMINISTRATIVE & HOME INSTRUMENT BUILDINGS HAVE ELEVATOR, CONDENSATE & SUMP PUMP MOTORS ON THE GROUND FLOOR
BUILDING "U" (UTILITY)
208 V·3Ø·4 WIRE SECONDARY DISTRIBUTION TO ALL BOILER ROOM MOTORS·400 A 4Ø BUS DUCT·208/120V·POWER & LIGHTING PANEL BOARDS DUCT FED LIGHTING PANEL BOARDS ALL KITCHEN MOTORS & CUTLETS HEATING UNITS & EXHAUST FANS & INCIDENTAL SERVICES KITCHEN·SHIPPING ROOM·BOILER RM. SHOPS·LIGHTING·ETC.
300 KVA·3Ø·4160/208/120V TRANSFORMER
OIL FUSE CUTOUT
600 HP 4160V SYN MOTOR & REDUCED VOLT STARTER—FURNISHED BY OWNER
3 COND. 300MCM 5 KV CABLE 3"C
PRIMARY SWITCHGEAR
440 V·3Ø SECONDARY TO 400 A 3Ø BUS DUCT
225 KVA 3Ø 4160/440 V TRANSFORMER
4160 VOLT 3 PHASE 60 CYCLE PUBLIC SERVICE CO SERVICE
SUB STATION E-1
SUB STATION E-3
BUILDING "E" (ENGINEERING)
SUB STATION E-2
OIL FUSE CUTOUT
225 KVA 3Ø 4160/208/120V TRANSFORMER
3 COND 300 MCM 5KV CABLE 3"C
208V 3Ø 4 WIRE SECONDARY DISTRIBUTION
UP TO PENTHOUSE
225 KVA 3Ø 4160/208/120V TRANSFORMER
208 V 3Ø 4 WIRE SEC. DISTRIBUTION TO
TO: ALL MOTORS IN PENTHOUSE·LIGHTING IN PH. FLOODLIGHT OUTLETS·SERVICE TO H & V FOR TEMP. CONTROL ETC. COND PUMP & ELEVATOR CONTROL·LIGHTING & POWER PANELS
3 COND 300 MCM·5KV CABLE·3"C
225KVA 3Ø 4160/208/120V TRANSFORMER
208V 3Ø 4 WIRE SEC. DISTRIBUTION TO
3 COND 2·5KV CABLE·3"C
225 KVA 3Ø 4160/208/120V TRANSFORMER
208V 3Ø 4 WIRE SECONDARY DISTRIBUTION TO
225KVA 3Ø 4160/208/120V TRANSFORMER
208 V 3Ø 4 WIRE SEC. DISTRIBUTION TO: ALL MOTORS IN PH. & ETC.
225 KVA·3Ø 4160/208/120V TRANSFORMER
208V 3Ø 4 WIRE SEC. DISTRIBUTION TO
BUILDING "S" SERVICE CO
BUILDING "A" (ADMINISTRATN
BUILDING "H" (HOME INSTRUMENT)

Simplest kind of electrical system—one of the calculated risks referred to earlier—was decided upon. This electrical diagram shows the elements of the system. Cost for entire project's electrical system has been calculated to be $1.18 per sq ft



Elevation of sanitary piping. Designed for low maintenance and upkeep, all fixtures and toilet stalls were off-the-floor type

Packaged-Boilers: (Cost saver) Since only low-pressure steam was required, and oil was to be used as fuel, "package" units were selected to save cost, and to save design expense. Two 400-hp, fire-tube, package boilers were installed. There was no process steam used in the operation, with the exception of the cafeteria requirements for cooking and dishwashing. Two boilers of identical size were purchased, rather than one large and one small unit; this permits a major part of the load to be carried by one boiler in case of a breakdown in the other.

Central Air Conditioning System: (Cost saver) Cost studies proved that one compressor, plus piped, chilled water, was the most economical system that could be installed. Also, the cost of one set of compressor, motor, and starting equipment, large enough to supply the entire load, was cheaper than two sets of smaller equipment. Also, a synchronous motor was specified, to correct power-factor and save on power consumption.

Movable Partitions: (Cost savers and flexibility insurance) First, all ceiling-high walls of any kind were eliminated, unless absolutely required for complete privacy. Next, pre-fab sectional partitions, 5 ft 6 in. high, were used for supervisory offices and operating conference rooms. In the engineering and laboratory building, ceiling-high Cemesto partitions were installed to provide sound isolation between office and shop sections. In the Utility Building, wire mesh partitions were used in all areas except where operations required dust-tight walls; there light-weight concrete block was used.

Underfloor Duct: (Good design, and necessary) These were installed in office sections, but limited to those areas where desks might reasonably be located. Ducts served both telephone and electric outlets. No above-floor fittings were installed unless necessary.

Toilet Rooms: (Designed for cleanliness and low maintenance) All fixtures and toilet stalls were installed off-the-floor. The floor covering was plastic tile on concrete; no floor drains were installed.

Television Connections: (For company product display) A multiple-outlet antenna system, made by the company, was installed in many locations. This Antennaplex system will also be used by Engineering for test purposes.

Public Address System: (For paging, music broadcast, emergencies, etc.) Company-manufactured equipment, installed throughout the project, was interconnected with other company plants and offices in the area.

Feeding Facilities: Both cafeteria and table service were provided, the latter in a private dining room. All cafeteria counters and kitchen equipment were stainless steel; a "dirty-dish" conveyor handled the removal of trays and dishes from the dining area in the cafeteria.

A common kitchen served both cafeteria and dining room. The kitchen was designed by an outside consultant, directed by our own staff food expert, and contained all stainless-steel equipment. Walls were of glazed tile; floors of grease-proof plastic tile; complete facilities were provided for feeding about 1500 people.

Acoustical Treatment: As a cost-saver, all suspended ceilings were eliminated, with the exception of small areas in the Administration building. Gypsum type acoustical tile was cemented directly to the underside of the structural slabs. No treatment was applied to the exposed air conditioning ducts in office areas. (Ducts were of flat, rectangular shape—uniform in size for full length; therefore, their architectural treatment was easily handled.) Acoustical treatment was applied to all buildings except the Utility Building.

Column Treatment: The use of Lift-Slab involved the installation of round, steel columns, 8 in. and 10 in. in diameter. Columns were filled with concrete, for fireproofing. Since there were no pipes, conduits, or other facilities rising vertically at the column locations, no furring or plastering was required.

As part of the general plan to eliminate maintenance, the columns were finished by applying attractive plastic sheet material to them.

Outside Facilities: A pattern of loop roads connected the two large parking lots with the two public highways bounding the property on north and south. Roads and parking lots were macadam type, with a heavy-traffic base.

All possible natural wooded areas were preserved; undergrowth was cleared, and trees were thinned out to present best appearance. Several small springs were encased in rock and became part of rustic picnic areas—as part of the employee recreational program. Other areas of the property were developed into tennis courts, softball fields, etc.

Public transportation buses are routed through the company grounds, and pick up and discharge passengers at bus shelters near the entrances to buildings. A truck dock is located in the connecting corridor area—between the Engineering and Utility Buildings. This serves all receiving and shipping functions, including mail, supplies, food, and shop materials. Landscaping was employed to beautify the grounds, and to conceal any facilities that were functional, but not necessarily too beautiful in appearance.

To provide adequate storage of water for fire protection, a 150,000 gal elevated tank was installed at the rear of the property. And, as a source of water, the company elected to drill its own wells.

Dispensary: (Necessary Function) A completely modern medical center is provided for pre-employment examinations and first-aid. This includes an attractive waiting room, examination area, laboratory, doctor's office, male and female wards, and treatment room. The dispensary is part of the Personnel Department located in the central Administrative Building.

cost-saving ideas . . .

To be used by Construction Forces on Lift-Slab Project

For the Electrical Sub-Contractor:

1. After base slab is poured, subsequent floor (and roof) slabs will move along in rapid succession. Have all possible conduit and box assemblies pre-fabricated, ready to lay into the slab.

2. As all "inner slab" conduit work will be done at ground level, take advantage of this fact—to save time on haulage of materials, layouts, etc.

3. All possible circuit wiring can be pulled into conduit prior to placement in slabs. (Precautions must be taken to prevent concrete entering pipe or boxes.)

4. Make full use of any simple layout jigs—or measuring sticks—to facilitate placement of boxes, sleeves, inserts, etc. (Once prepared, these can be used repeatedly on typical floors.)

5. As all slabs will be cast on the ground, it is possible to obtain perfect vertical alignment of sleeves, etc. Have all such items prepared in advance, ready for quick insertion.

6. Remember that the form, on which all work is to be cast, is concrete, not wood. Therefore, you will not be able to nail down inserts, boxes, etc. (The Lift-Slab contractor will instruct you on best methods of anchoring.) Check this angle before you are ready to place conduit and boxes. (Suggests use of powder-actuated tools and thereby eliminate costly inserts.)

7. In the process of lifting the slabs, the Lift-Slab system performs in the manner of a giant "elevator"; therefore, you should let them carry up all possible equipment, materials, etc., during the lifting operation.

8. In general, the Lift-Slab system will "pace" the job. Since no lengthy forming time is required, you can pick your crew and supervision to get best labor utilization. Reinforcing steel goes down fast; then the Lift-Slab contractor will want fast action on electrical work, so that concrete can be poured. After the concrete has a couple of days to set, the performance will be repeated for the next slab. Worn-out form materials, cost of shoring, cleaning, salvaging and clearing are eliminated.

For the Mechanical Sub-Contractors:

Items 4 to 8, inclusive—for electrical sub-contractor—also apply to your work. You contractors, particularly, should make fullest possible use of the Lift-Slab as an "elevator" for your equipment. Ventilating fans, wall radiation, plumbing fixtures, etc., can all go up in the air when the slabs go up.

For the General Contractor:

A comprehensive study of the Lift-Slab method will present many cost-saving ideas for you. Doors, ornamental iron, etc., can be lifted with the slabs and roofs. Close coordination on your part will speed the entire job, thus reducing construction time and job overhead.

For the Roofing Sub-Contractor:

Let us repeat—all of your insulation, roofing felt, etc., can go right up with the roof slab. And, at ground level, you can unload directly from a truck—at several spots—onto the roof slab, to minimize the distance you have to carry materials for placement.

General Comments by the Owner

We have devoted a great amount of time—and expense—to the study of Lift-Slab. We are firmly convinced that it is one of the greatest advances in building construction methods of our time. Also, we sincerely feel that considerable savings will result from the use of this technique.

If we are to reap the savings possible from the use of Lift-Slab, we must have the hearty and enthusiastic cooperation of all trades on the job. We feel that you will be getting a wonderful indoctrination in this technique on our job; therefore, we expect all of you to help us make the job a complete success. We have selected contractors whom we feel will be sympathetic toward innovations in this field; and those whom we feel will do everything possible to let us participate in the savings we know are possible.

Vendors and Subcontractors for Cherry Hill Project

Acoustical treatment—Armstrong Cork Co., Lancaster
Asphalt tile—Kentile, Inc., New York
Boilers—Kewanee-Ross Corp., Kewanee, Ill.
Busduct and trolley duct—Bulldog Electric Co., Detroit
Compressor, refrigeration—York Corp., York, Pa.
Conduit—Triangle Cond. & Cable Co., New Brunswick
Conduit fittings—Crouse-Hinds Co., Syracuse, N. Y.
Underfloor Duct, electrical—National Electric Products Corp., Pittsburgh
Controls, air cond.—Minneapolis-Honeywell, Philadelphia
Doors, frame—Williamsburg Steel Prod., Brooklyn
Doors, o'head—Overhead Door Corp., Hartford City, Ind.
Elec. Outlet Boxes—Columbia Elec. Wks., Columbus
Elevators—Montgomery Elevator Co., Moline, Ill.
Glass—Pittsburgh Plate Glass Co., Pittsburgh
Lighting, fluorescent—Smithcraft Lgtg. Div., Chelsea, Mass.
Water cooling equip.—Water Cooling Equip. Co., St. Louis
Lighting, fixtures, (misc.)—Daybrite Lgtg. Co., St. Louis
Klemm Reflector Co., Philadelphia
Sylvania Electric Prod., Inc., New York
Westinghouse Lighting Div., Cleveland
Paint—Patterson-Sargent Co., Cleveland
Panel systems, wall—General Bronze Corp., Garden City
Insulated porcelain panels—Ingram-Richardson Co., Beaver Falls, Pa.
Foamglas Insulation in Panels—Pittsburgh Corning Corp., Pittsburgh
Office Partitions—Holly Assoc., Inc., Merchantville, N. J.
Storage Cabinets—Penn Metal Corp. of Pennsylvania, Philadelphia
Structural Tile—Industrial Metals Co., Philadelphia
Metropolitan Brick Co., Canton, Ohio
Panelboards—Trumbull Dept., Plainville, Conn.
Partitions, fire-resistant—Par-Lock Appliance, Trenton
Partitions, toilet—Metpar Steel Products Co., L. I., N. Y.
Sash, aluminum—Michael Flynn Mfg. Co., Philadelphia
Steel columns for Lift-Slab—Tubular Products, Inc., Soudertown, Pa.
Steel frame (utility bldg.)—Luria Engrg. Corp., N. Y.
Miscellaneous Structural Members—Unistrut Products Co., Chicago
Switchgear, high voltage—General Electric Co.
Transfs., distribution—Marcus Transf. Co., Rahway, N. J.
Wire and cable—General Cable Corp., Perth Amboy
Plumbing fixtures—Crane Co., Chicago, Ill.
Electric water coolers—Sunroc Co., Glen Riddle, Pa.
Floor and shower drains—J. R. Smith
Roof drains—J. R. Smith
Grease interceptors—J. R. Smith
Wall hydrants—Woodford Hydrant Co., Des Moines
Lawn hydrants—Murdock Mfg. & Supply Co., Cincinnati
Fire hose cabinets—Elkhart Brass Mfg. Co., Elkhart
Fire hose racks—Elkhart Brass Mfg. Co., Elkhart
Post indicator valves—Traverse City Iron Works, Mich.
Fire pump for filling elev. tank—Chicago Pump Co.
Sump pump—Chicago Pump Co., Chicago
Pneumatic compressor—Chicago Pump Co., Chicago
Hot water generators—Patterson-Kelley Co., E. Stroudsburg, Pa.
Pressure Tank—Buffalo Tank Corp., Dunellen, N. J.
Fire hydrants—Traverse City Iron Works, Mich.
Sprinkler heads—Reliable Automatic Sprinkler Co.
Elevated water tank—Hammond Iron Wks., Warren, Pa.
Manhole covers and frames—S. J. Creswell Iron Wks., Philadelphia
Catch basin frames and gates—S. J. Creswell Iron Wks.
Water closet chair carrier fittings—J. A. Zurn Mfg. Co.
Lavatory chair carriers—J. A. Zurn Mfg. Co., Erie
Urinal chair carriers—J. A. Zurn Mfg. Co., Erie
Domestic h. w. circ. pumps—Bell & Gossett Co., Morton Grove, Ill.
Automatic temperature controls—Powers Regulator Co., Skokie, Ill.
Heat exchangers—Patterson-Kelley Co., Inc., E. Stroudsburg, Pa.
Fuel oil tanks—Buffalo Tank Corp., Dunellen, N. J.
Boiler water receiver—Buffalo Tank Corp., Dunellen
Steam specialties—C. A. Dunham Co., Chicago
Fin radiation—The Kritzer Co., Chicago
Underground conduit—Durant Insulated Pipe Co., Palo Alto, Calif.
Supply air fans—American Blower Corp., Detroit
Exhaust fans—American Blower Corp., Detroit
Roof exhaust fans—Davidson Fan Co.
Building relief fans—American Blower Corp., Detroit
Unit ventilators—American Blower Corp., Detroit
Unit heaters—American Blower Corp., Detroit
Air conditioning units—American Blower Corp., Detroit
Heating and cooling coils—American Blower Corp.
Htg. circ. pumps—Bell & Gossett Co.
Cooling tower—Water Cooling Equipment Co., St. Louis
Chilled water pump—Allis-Chalmers Mfg. Co., Milwaukee
Condensate pumps—Chicago Pump Co., Chicago
Boiler feed pumps—Chicago Pump Co., Chicago
Fuel oil pumps—Sier-Bath Gear & Pump, North Bergen
Flow meters—Meriam Instrument Co., Inc., Cleveland
Steel stack—Philadelphia Iron Works, Philadelphia
Air diffusers "A" Bldg.—Anemostat Corp., New York
Air diffusers, other bldgs.—Tuttle & Bailey, New Britain
Grilles and registers—Titus Mfg. Co., Waterloo, Iowa
Air filters (steel core)—Continental Filter Corp.
Duplex oil strainer—Elliott Co., Jeannette, Pa.
Expansion tanks—Bell & Gossett Co., Morton Grove
Motors—Robbins & Myers, Inc., Springfield, Ohio
Starters—Clark Controller Co., Cleveland
Flush valves—Sloan Valve Co., Chicago
Concrete sewer pipe and fittings—Keystone Clay Prod.
Terra cotta sewer pipe, fittings—Keystone Clay Prod.
C. I. pressure pipe, fittings—U. S. Pipe & Foundry Co., E. Burlington, N. J.
C. I. soil pipe and fittings—Salem Pipe & Foundry Co.
Galv. drainage fittings—Grinnell Co., Inc., Providence
Bldg. & Galv. steel pipe—Bethlehem Steel Co., Bethlehem, Pa.
National Tube Co., Pittsburgh
Republic Steel Corp., Cleveland
Alarm check valves—Reliable Automatic Sprinkler Co., Inc., Mt. Vernon, N. Y.
Copper tubing—Phelps Dodge Corp., New York
Solder joint fittings—Acheson Mfg. Co.
Sweat end valves—Scott Valve Mfg. Co., Detroit
Iron body valves for plbg. and htg.—Scott Valve Mfg.
Cast iron fittings—Grinnell Co., Inc., Providence
Pipe hangers—Sherman Pipe Hgr. Wks., Philadelphia
Penn Pipe Hanger Co., Philadelphia
Carpenter & Patterson, Inc., Boston
Grabler Mfg. Co., Cleveland
Black malleable iron fittings—Grinnell Co., Inc., Providence
Gas cocks—Kitson Div., The Wellsbach Corp., Philadelphia
Sprinkler Valves—Traverse City Iron Works, Mich.
Blk. w. i. pipe—A. M. Byers Co., Pittsburgh
Welding fittings—Tube Turns, Inc., Louisville
Taylor Forge & Pipe Works, Chicago
Roof Insulation—Owens-Corning Fiberglas Corp., Toledo
Roofing—Barrett Div., Allied Chemical, New York
Roofing—Foamglas Panels—Pittsburgh Corning Corp., Pittsburgh

Subcontractors and Services

Acoustical treatment—Berger Acoustical Co., Philadelphia
Brickwork and tile—John B. Kelly, Inc., Philadelphia
Cast stone—W. N. Russell & Co., Westmont, N. J.
Concrete, ready-mixed—Camden Lime Co., Camden
Electric specialties—Kurt Verson Co., Englewood, N. J.
Electrical installation—Fischback & Moore, New York
Floor covering—Master Floor Covering Co., Philadelphia
Grading—Edward Ellis, Inc., Merchantville
Granite—French Creek Granite Co., St. Peters, Pa.
Heating, air conditioning—Daniel J. Keating Co.
Insulation—Triangle Insulation Co., Philadelphia
Liquid separating medium—Techkote Co., Inc., Englewood, Calif.
Millwork—John A. Yohn Co., Philadelphia
Paving—Roads, parking lot—Mack Paving & Construction Co., Philadelphia
(Rough grading)—Edward H. Ellis, Inc.
Reinforcing bars—Concrete Steel Co., Philadelphia
Reinforcing steel placement—G. & H. Steel Service
Rigging—Ralph Cornell, Woodbury, N. J.
Roadwork—John Meehan & Sons, Philadelphia
Roofing—Wm. C. Kulzer Co., Philadelphia
Sheet metal installation—Clermont Engineering Co., Inc., Philadelphia
Structural slab lifting—Ohio Lift-Slab Co., Cleveland
Testing of Materials—E. L. Conwell & Co., Philadelphia
Venzie Corp., Philadelphia

Compressed Air—Via Plant's Steam Line

Equipment modernization meant more compressed air . . . But, what pressure should we use? . . . What compressor size? . . . And what about a piping system? . . . After considering all these questions, here is how we "got the air"

By E. CUMMINGS, Chief Engineer, The Cleveland Chain & Mfg. Co., Cleveland, Ohio

ABOUT THREE years ago our company began to improve and modernize some of its machines. As we went into details of these changes it seemed desirable to provide some of the operating motions with fluid power. Pressures required were not high enough to warrant providing hydraulic power units for each machine or group of machines so we decided to operate parts of our rebuilt machines with air cylinders.

Our first compressor serving an experimental machine with two 4-in. cylinders was a 10 cu ft machine and of adequate size for the purpose. This compressor was in operation but a brief period when our plating plant wanted to "borrow" some air for paint spraying. Then a sandblast cabinet came into the picture and proved we were at the end of our rope—in fact, beyond it. Everything else stopped when sandblasting started! And the tool room was asking about air vises, grinders, and so on.

We were forced to expand our compressor capacity and build an air distribution system. The time had come to do a little planning.

First, a bigger compressor was needed. We reviewed compressor and pneumatic tool catalogs and found that the standard pressure available from most single stage compressors was in the vicinity of 100 psi and most devices did not require pressures greater than this. So we decided to use pressures of 100-125 psi.

The next question was not so easy to answer. How large a compressor—capacity-wise—did we need? We looked over the books and catalogs and asked the manufacturers of air devices, but always came back to the same implied, or stated, question—what devices and how many of them were we planning to install? They might as well have asked, "How high is up?"

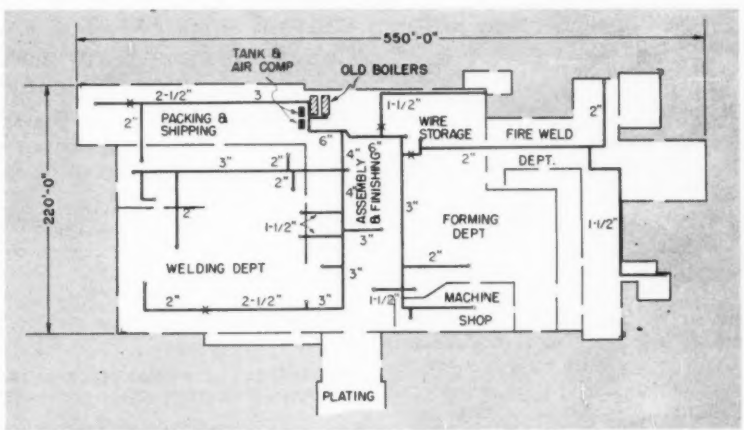
We finally pulled out the crystal ball and went into a trance. The figure 250 seemed to have some significance, perhaps because our total floor space is about 250,000 sq ft including storage space. By doing a little rationalizing we were able to convince ourselves that one cubic foot of compressed air per thousand square feet of floor space was a fair starting point. If we found we had missed our "guesstimate" too far, we could always add additional 250-cu ft units.

Second, we had a piping system to think about. Where should we run our lines and what size should they be? We could see a lot of man-hours ahead cutting, threading and hanging large pipe. We could see, too, that there were quite a few pipes and conduits already installed along the roofs and ceilings, and we would undoubtedly have many interferences and detours to cope with in making an additional piping installation.

Just what were these other pipes? We checked through and found that we had electric lines for power and light, gas lines, well-water lines, city water lines, cooling water drain lines, and steam lines.

Steam lines? Whoa, we are using gas unit heaters now, why did we need the steam lines? Process steam was used only in the plating and galvanizing plants. Steam plant and piping in chain section were totally abandoned.

Why not use this complete system as our compressed air supply? The pipe was all in fair shape and the bad parts could be easily replaced. We could install our compressor near the abandoned boilers and connect it directly to the 6-in. header after disconnecting it from the boilers. Everything considered it looked like an inexpensive solution to an expensive problem. We would have little new pipe to install for our compressed air system and would be spared the job of removing the steam piping system.



What about installing a new piping system? This was not necessary since we were able to convert the old steam line, above, to supply our compressed air needs

The sizing of the piping too should be highly satisfactory as the compressor would be located adjacent to the old boilers and the pipes reduced in size as distance from compressor increased. From this basic network it would be simple to extend 50 or 100 ft at any point and have practically complete coverage of all our floor space. We could find nothing in the book advising against using existing piping for compressed air.

So we began installing our new system. We bought a compressor and installed it with a large storage tank and all the accessory equipment, near the old boilers. We disconnected the 6-in. main steam line from the boilers

(Continued on page 142)

Fig. 1. Use of seamless steel tubing (arrow) results in smooth non-clogging flow of various spray-materials to paint booths

Convair's Conveyorized Painting

Conveyors move parts to and from booths . . . Air powered units pump paint from central supply area . . . Material is fed into overhead lines directly from shipping container

By **REX GRIMES**, Foreman Finishing Dept., Convair Plant II, San Diego, California

CONVAIR, A DIVISION of General Dynamics Corporation, is operating a paint-spraying system at Plant Two in San Diego which is similar to installations in the automotive industry. The system contains modifications which make it one of the most modern facilities in the aircraft industry. The new paint shop began operations in July 1953 and in a year and a half the system has not been shut down for maintenance.

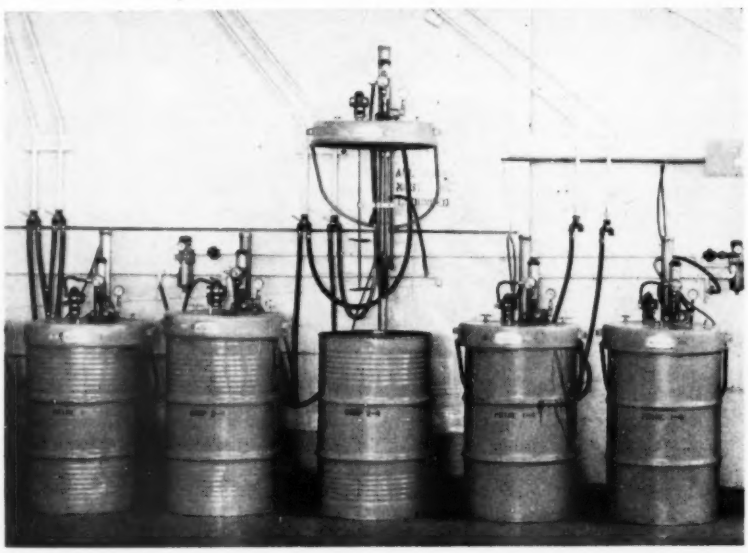
Experience during 12 years in Studebaker's finishing department, brought mass production know-how to the plant's new finishing system. Biggest problem was how to make the arrangement work under the demands of production as well as with small numbers of dissimilar parts.

The sytem has four supply lines and recirculates the material in the lines to prevent clogging or settling of pigments. Seamless steel tubing is used instead of black iron pipe previously used on most systems. Although more than 2,200 ft of one-inch pipe are involved, there has been no clogging.

In order to insure versatility, three moving conveyor lines were installed; these include cross-rod and turntable types, Figs. 3 & 4. The cross-rod conveyor has nine stations at capacity. The turntable conveyor utilizes seven stations when operating at its peak.

The cross-rod system has four paint stations, while the turntable conveyor uses two throughout the continuous "S" shaped line. Both systems have drying stations and points at which parts are turned over by hand for painting opposite sides.

Fig. 2. This is a portion of drums in mixing room. Compressed air is used to agitate paint in drums and to operate pumps. Containers are grounded when in use



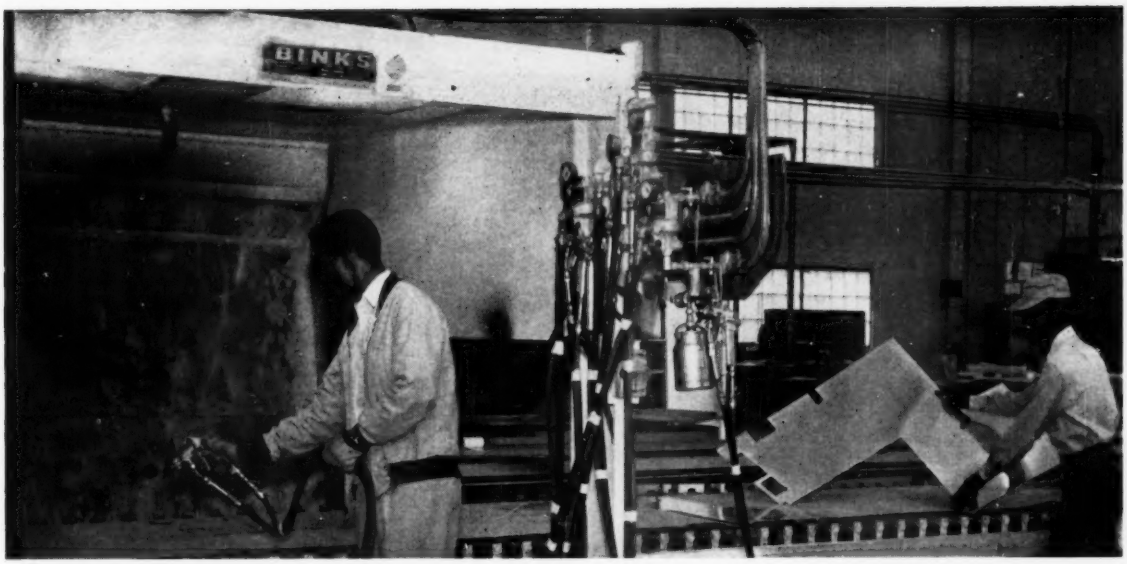


Fig. 3. Cross-rod conveyor has variable drive with 10 to 35 fpm range; turnover station is to right of water-screen booth

Parts to be painted, first must be cleaned. The painting facility is well located in this respect for the processing department is adjacent for easy flow of various parts to the different belt conveyors which carry them to the painting and drying stations.

Paint for the system is drawn from a central mixing room, Fig. 2, insuring safety, reducing waste, and saving man-hours. The types of material used in the system are: yellow and green zinc chromate primer, liquid envelope, and vinyl sealer.

Non-clogging operation of the unusually long piping system is attributed to the smooth bore of the one-inch seamless steel tubing with its compression fittings. As added insurance, material is recirculated on a 24-hr basis. The system, however, is fitted with a single switch for shutdown. It can be completely pumped free of material, and flushed with thinner in the event of long periods of inactivity.

At the end of each conveyor cycle, parts are taken off and put on a long belt conveyor where inspection and part number stamping operations are completed, Fig. 5. The belt conveyor moves the parts into a routing center for distribution.

Quality control is maintained at highest levels. This is due largely to the location of all paint sources in a central mixing room. Each paint station gets material of the same consistency and the same pressure at all times. The system is capable of operating between the ranges of 5 to 65 lb pressure which can be regulated at each paint station.

Housekeeping is simplified also due to the central mixing system as contrasted with the old method of mixing paint separately for each station then pouring it into containers, which created a dangerous fire and accident hazard. Total consumption can be measured at the source in the mixing room.

Only minor problems have been experienced in maintaining the system, such as cleaning small screens on the individual spray guns.

Fig. 4. Parts completing their cycle of travel on 240-ft turntable conveyor are transferred to line at upper right (arrow)

Fig. 5. Inspected parts move on an endless conveyor to the distribution room through the opening seen below overpass

Dual-Purpose Jig Simplifies Flange and Shaft Drilling

Bolt hole drilling formerly required measuring, marking and clamping . . . Jig performs operations almost automatically . . . V-block clamp handles shaft drilling jobs

By F. E. RILEY, Mechanical Engineer

DESIGN PURPOSES of this drilling jig include locating and drilling of equally-spaced bolt holes in circular flanges and the drilling of diametric holes through shafts. The jig was first designed for the production of a single product, in a wide range of sizes and types. Drilled flanges and shafts were common features of the product, varying only in size, and this condition was conducive to the design of a single drilling jig that could function adequately for the output required.

As constructed, the jig has proved to be a versatile piece of equipment. Apart from its use on batch production work, it has been valuable for maintenance and for single-unit jobs. On flange drilling, for instance, bolt holes can be equally spaced and drilled without any preliminary marking or equipment setups for securing the work to the drill press table. Diametric holes can be drilled in a range of shaft diameters, also without any marking or awkward setups. The jig is suitable for use as a general piece of equipment for maintenance and repair work.

In designing the jig, the initial object was to make it adaptable to a wide range of component sizes. Other considerations included minimizing of detachable parts such as drill guide bushings and clamps, and making work location as automatic as possible.

For holding and locating flanges, a standard 3-jaw self-centering chuck is vertically mounted on a horizontally sliding plate. The chuck back plate is notched on its perimeter with 24 equally-spaced slots for engagement with a wedge-shaped indexing pin. The chuck jaws are of modified form so that they interfere as little as possible with the drill when it penetrates a flange. The chuck jaws are of soft steel, machined to shape, then hardened and ground to insure concentric gripping.

Advantage of using a self-centering chuck as a work holder is its adaptability to various flange diameters and the concentric mounting obtained. With 24 slots around the back plate perimeter, hole groupings in multiples of three or four slots can be obtained; for example, equally spaced holes may be drilled in a flange in fours, eights or twelves.

Apart from the number of holes in flanges, the hole diameters and the radii of their pitch circle can vary from one component to another. Pitch circle radius is adusted by sliding the plate on which the chuck is mounted toward or away from the center line of the jig. The exact pitch circle radius required on the flange can be obtained by aligning the pointer attached to the sliding plate with the steel rule secured to the jig base plate. As illustrated, the pointer is aligned with the 2 in. graduation on the rule, so that holes will be drilled on a pitch circle of 4 in. diameter. If the slide is adjusted so that the pointer is in line with the zero position, the drill guide bushings in the bushing plate will be aligned with the axis of the work.

Pitch Circle Adjustment

The sliding plate is guided in a straight path by means of a long square key which is secured in a slot machined in the jig base plate. The upper part of the key engages with a slot in the underside of the sliding plate. Once set for producing the required pitch circle radius, the sliding plate is locked by means of four socket head bolts engaging with tapped holes in the jig base plate through elongated slots in the sliding plate.

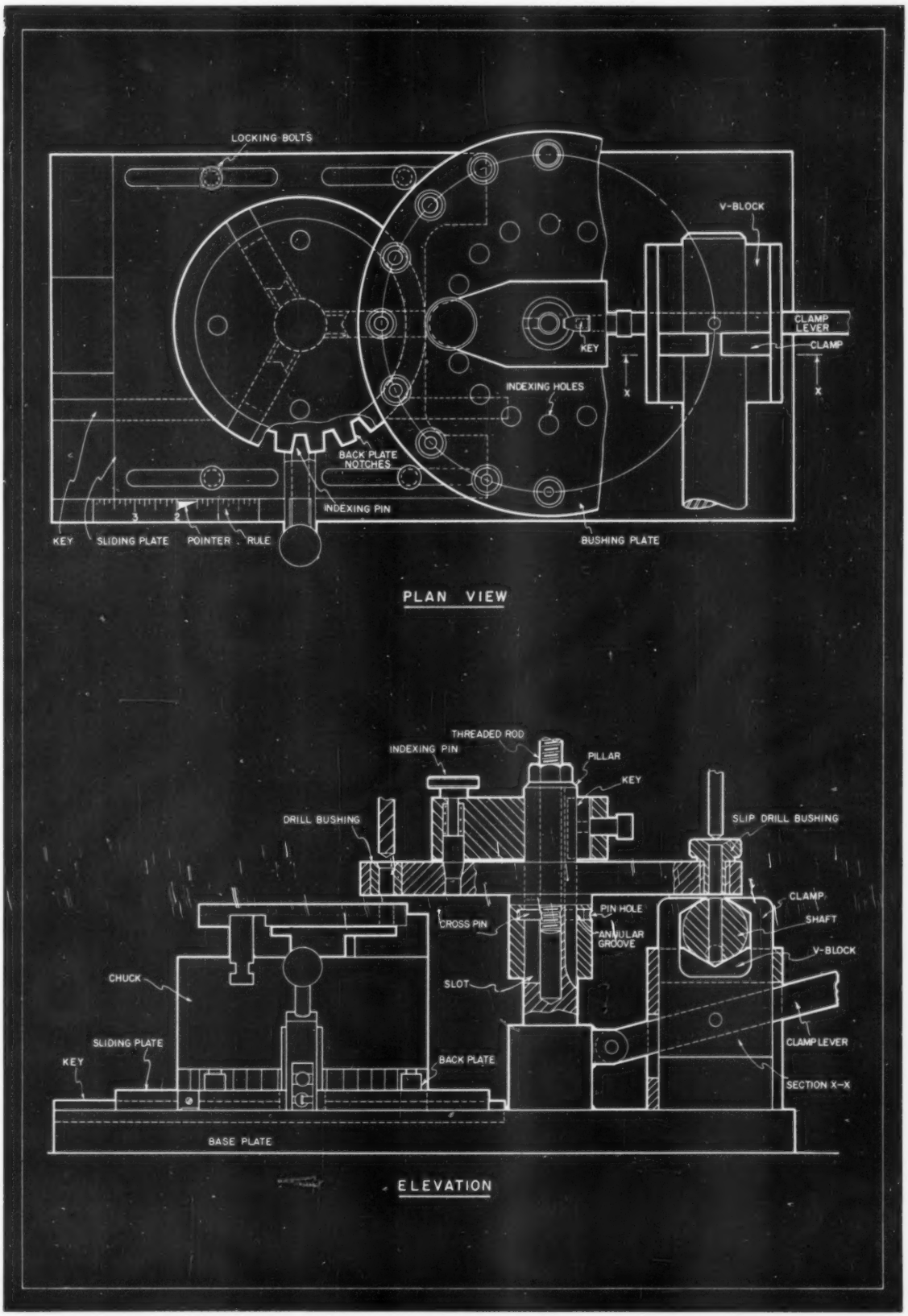
In the center of the jig a vertical circular pillar serves as the vertical shaft for the bushing plate. The plate carries 16 standard drill guide bushings of the headless type, the bore diameters sized to the drill diameters required for flange or diametric hole drilling. For general and maintenance work, the drill bushing sizes can start at ⅛ in., for example, and increase in increments of 1/64 in. or any other combination. To further extend the versatility of the jig, one station on the drill bushing plate is fitted with a slip-type headed bushing mounting, so that a drill diameter not provided for by the standard set of bushings can be accommodated. The pressed-in headless bushings have their bore sizes stamped into the top surface of the plate adjacent to them.

For each drill bushing station on the plate an indexing hole is provided on a smaller pitch circle radius. The indexing pin is mounted vertically in a holder secured to the central pillar and is spring-urged into engagement with the indexing holes in the plate. The conical end of the pin insures accurate positioning with a tight fit. To accommodate different component heights, the bushing plate and indexing pin holder can be adjusted vertically on the pillar, so that the drill is guided as closely as possible to the work.

Height adjustment of the indexing pin holder is accomplished by unlocking the wedge-shaped key which slides in a keyway machined in the pillar. Height adjustment of the bushing plate is made with the screwed rod passing down an axial hole drilled in the pillar, a hex nut serving to raise or lower the rod to which the lower boss of the bushing plate is connected by means of the cross pin. The cross pin is driven into a hole through the lower end of the screwed rod and passes through a longitudinal slot machined through one side of the pillar. The outer end of the pin engages with an annular groove machined in the bore of the boss which can thus be rotated while the stationary cross pin supports it vertically. A hole drilled through the wall of the boss permits insertion of the pin.

To use the jig the operator must know the number of equally spaced holes needed in a flange, their pitch-circle diameter or radius and their diameter. He grips the flange in the chuck jaws and sets the circle radius by means of the rule and pointer, locking the sliding plate at the required setting. The hole diameter is selected

(Continued on page 142)



Plan and elevation drawings of drilling jig. Three-jaw chuck and indexing plate rotate independently on vertical axes

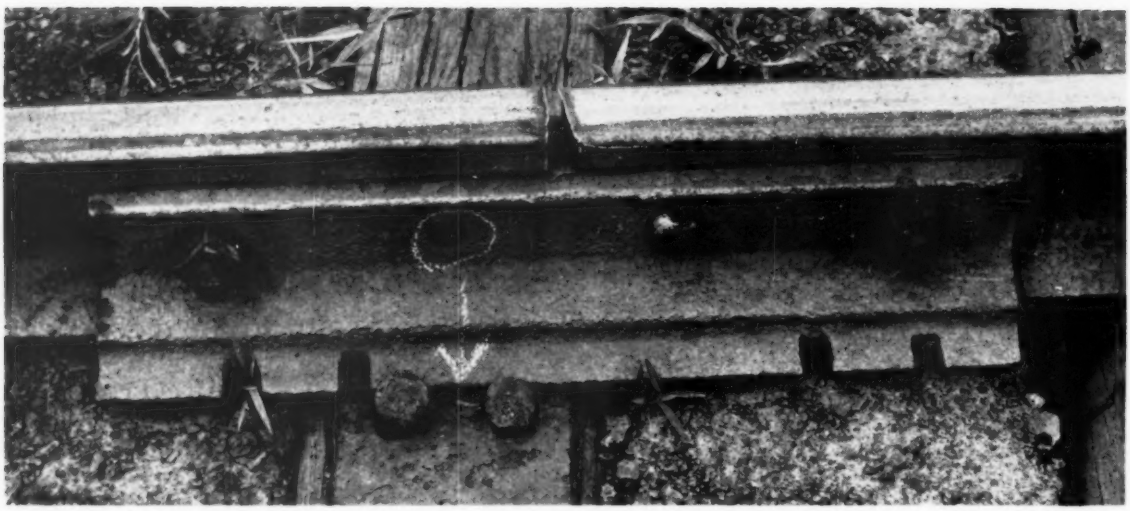


Fig. 1. Deteriorated joint. Poor drainage has disintegrated tie. Joint not properly seated, bolts missing, rail ends battered

INDUSTRIAL RAILROAD TRACKAGE
III—Maintenance of Rail and Rail Joint Bars

How to purchase rail economically . . . Factors to be considered in selection . . . Types of rail joints and how they are used . . . Types of joint fastenings and how they are maintained . . . Special rail devices and how they are used

By B. J. MYERS, L. B. Foster Company

CONSIDERING THE problems of maintenance of industrial trackage from the bottom up, we have covered the ballast and roadbed, ties, tie plate and spike fastenings. The next "story" in our track structure is the rail.

Needless to say, volumes can be and have been written on the design and manufacture of steel rails. There are at least six agencies that have established rail design standards.

About the Author

B. J. Myers is general sales manager of L. B. Foster Company's Chicago office and has been with the company for ten years. During this time he has specialized in the design, construction and the maintenance of industrial trackage. After schooling at the University of Colorado, Mr. Myers spent three years in the Air Force and then joined the L. B. Foster Company.

Fortunately, the average industrial rail user need not concern himself with this detailed information. In the case of construction of new track, the services of an engineer or firm specializing in the railway field should be employed for design and specification. In the case of replacement of work rail, probably the safest practice would be to install the same type and weight of rail as that being discarded. The single most important factor to keep in mind is the rail weight, a heavier class of rail being required for lines bearing heavy traffic. In that connection, when rail is being replaced, it may be desirable to go to a heavier or lighter weight of rail if the traffic pattern has changed one way or the other. The tendency today is to use a heavier weight rail.

It should be pointed out that substantial savings can be obtained in track costs in industrial plants by using relaying or "second-hand" rails rather than new rails. Recognized rail suppliers offer relaying rails that have been thoroughly reconditioned to "like new" specifications. High quality used rails are selected and processed painstakingly so that they will meet all standards specified by the various railway engineering associations. Reconditioned rails are inspected by the rail supplier to see that they fully meet requirements before they are okayed.

Rail Joints

One of the most critical components of rail construction is the rail joint. A rail joint is a fastening designed to unite rail sections into one continuous rail. Also, the rail joint serves to hold rail ends accurately, evenly and firmly in place to assure even rail surface and rail alignment.

Essentially a rail joint consists of two joint bars or steel members which are installed one on each side of a rail. They are held in place with bolts and usually with spring washers to assist in maintaining bolt tension.

There are two basic types of rail joints used for industrial track work: the angle bar and the splice bar. The angle bar is a steel bar which is rolled in a variety of cross-sections. The splice bar, on the other hand, is a simple flat bar. Angle bars and splice bars are "mated" for the rail on which they are to be used, and specifications generally list them together with the data on the rails so that they can be easily matched when ordering.

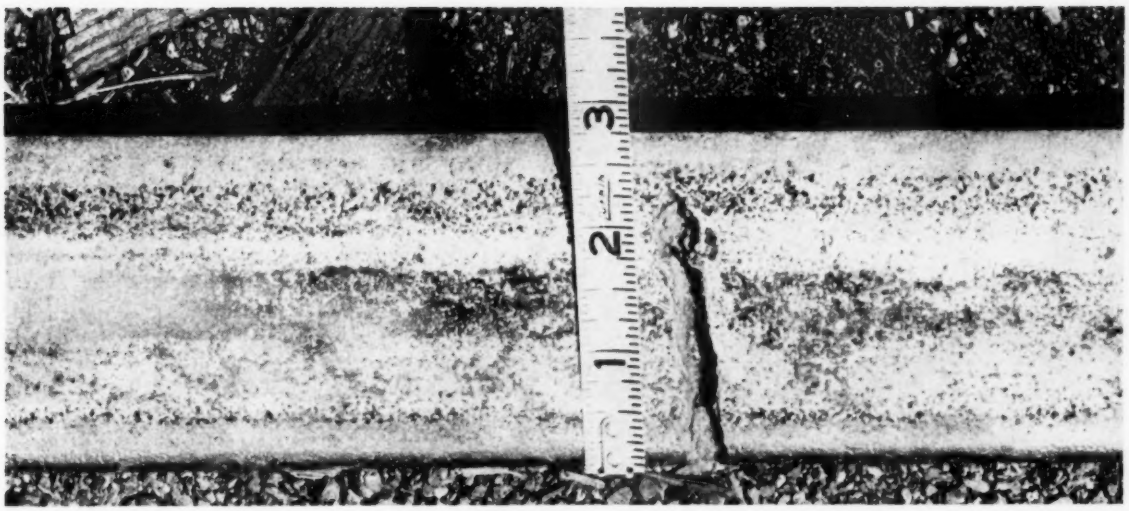


Fig. 2. Here, lack of adequate support has caused badly damaged rail. Ties and roadbed have completely deteriorated

As in the case of rail, substantial economies can be effected by purchasing used rather than new angle and splice bars. These are available for the various weights of rail, so that it is possible to get the proper match necessary for satisfactory service. Data given to a supplier when ordering angle and splice bars should include the specifications of the rail section on which it is to be used, exact location of holes to be drilled, diameter of holes and bolt size.

For cases where it is necessary to connect rails of different heights and sections, a special joint known as a compromise bar is used. This may be an angle or a splice bar of such shape that it brings the gage sides and the crowns of the rails into line and maintains them in position. When the variation in height between the two rails to be joined is more than ½-in., an accessory known as a "step chair" is used. It is a stepped flat plate unit which provides proper support and gage alignment for the smaller of the rails.

Joint Fastenings

Some plants having an electrified trackage system also have need for insulated rail joints. They are designed to arrest the flow of electric current from rail to rail, as at the end of a track circuit, through the use of non-conductors which separate the rail ends from the other metal parts. These should be installed and maintained under the supervision of a track expert.

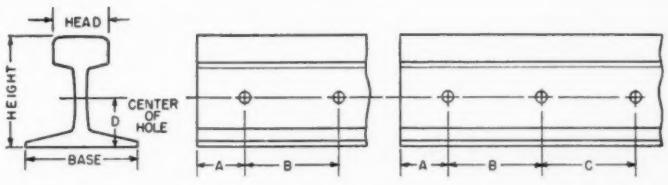
As noted earlier, rail joints are held in place with bolts and spring washers or nut locks. Standard track bolts are of button head, oval neck design, fitted with square nuts. Bolt head and neck are forged steel with U. S. Standard rolled threads, free-fit style. In specifying the bolt size, the nominal diameter given is the over-all thread diameter. The length is measured from under the head to the extreme end of the bolt. Track bolt nuts are commonly made to American Standard heavy unfinished square design, with or without crown or chamfer.

Since it is uneconomical, if not completely unfeasible, to properly reclaim used bolts, they should be purchased new and in first quality. Regardless of how well the various components of the track structure are made, the structure will only be as sound as the fastenings, such as bolts, spikes, etc. Bolts are packed in standard 200-lb kegs.

As a means of maintaining adequate and uniform bolt tension, spring or lock washers are used with the track bolts. These are of two general types, either single or double convolution. While rail joint assemblies should not be so tight that rail movement due to temperature change is restricted, if bolts are too loose, wear on the rails, joint bars, bolts and nuts is accelerated. The washers furnish positive resistance to the backward movement of nuts, assure uniform tension at desired degree of tightness, and serve to absorb shocks and impacts from rolling loads.

A track bolt should be long enough to pass through the joint bars, the rail web, the washer and the nut. When the nut is firmly in place about two of the bolt threads should remain on the

Simple Method of Ordering Rails



A simple method of ordering rails is the following technique. Place a piece of paper against the end of the rail to be replaced and impress its outline into the paper, by pressing a finger against the rail edges. Be sure the paper does not move while the impression is being made. On the impression, mark the height, base and head dimensions, as well as the following: Distance from end of rail to center of first hole—A; distance from center of first hole to center of second hole—B; distance from center of second hole to center of third hole—C—if six-hole bar is to be used. Hole diameter and elevation—D—(location above rail base). This information will aid your supplier in giving you prompt and accurate service.

outside of the nut. If the bolt is too long, the nut may reach the inner end of the threaded portion before the bolt is tight. A bolt that is too short will not give full thread service.

Depending upon the specific design of the joint, four or six track bolts are used. In fastening a rail joint, the heads of the first and third track bolt are placed on the outside, and the heads of the second and fourth bolts on the inside of the rail so as to prevent a derailed wheel from stripping all the nuts from a joint.

Two classes of fit are used in trackage work, wrench-tight fit and finger fit. In either case, a single-end or a double-end track wrench is used, and the fit is determined by the load on the hand wrench. Spring washers must be used for a finger fit, but may or may not be used for a wrench fit.

There are a number of devices that are used in trackage work to supplement the "holding" force of the ties, tie plates, rail joints, spikes and bolts. One of these is the rail anchor or "anti-creeper." The primary function of this device is to hold the rail in a fixed position with respect to the tie by checking the longitudinal movement of the rails under traffic. This movement is known as "creepage" and is the origin of the name anti-creepers.

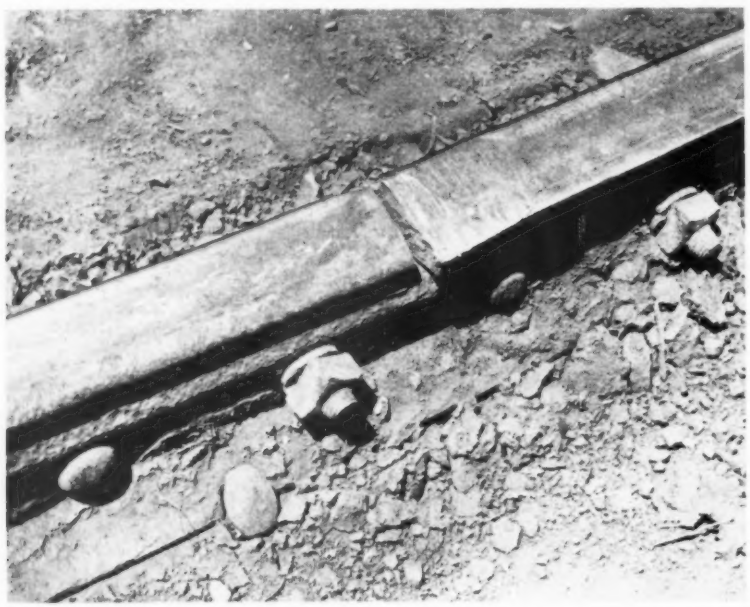


Fig. 3. Note battering of rail ends at the joint. Track structure deteriorated

Fig. 4. Incorrect size of bolts; bolts must extend through nuts or they will loosen

Rail creepage causes slewed ties, uneven surface and gage, and misalignment of switches and switchgear. Among the first evidences of rail creepage are the closing of expansion joints in the direction of creeping and the opening of joints at the starting point of the creepage. Marks begin to show on the rail flanges where spike heads scrape the rails as they slide. Joint ties are slewed and crowded ahead, forcing the ballast ahead of them and leaving crevices in the ballast behind. There is a danger of track kinking where the tendency to creep is severe.

The solution to the problem of rail creepage is to drive the rails back to original positions and to apply a sufficient number of rail anchors.

Function of Rail Anchor

Generally, anchors are of the one- or two-part type. They attach to the base of the rail to bear against the side of the tie or tie plate, or both. Creeping pressure of the rail is thereby transmitted from the rail to the tie and through it to the ballast.

A well-designed rail anchor should have few parts, be easily installed, adjusted and removed so that it can be re-used many times. It should provide ample bearing surface against the tie so that undue cutting and wearing is eliminated. Some types are installed with a special — but simple — tool; others can be installed or removed with a standard spike maul or sledge.

Another important device used to maintain proper track alignment is the gage rod. Track gage is defined by the American Railway Engineering Association as the distance between the heads of the rails, measured at a point 5/8 in. below the top of the rail. Incorrect gage permits lateral thrust by the rolling stock with resultant unequal wear on the rail. This leads to poor riding qualities and severe wear of the various component parts of the track structure.

The standard gage is 4 ft, 8½ in., but this figure must sometimes be increased on sharp curves. The primary function of the gage rod is to anchor each rail to the other, thereby maintain the gage. The detailed design of this equipment includes a means of adjusting the rod for quick installation, establishment of the exact gage desired, and the necessary draw-up for wear. The jaws which hold the gage rod to the rail should be wide enough to prevent the rods from turning diagonally, which tends to tighten the gage.

Use of gage rods is imperative on curves where installation of a rod on either side of the outside joint in curved track will prevent the joint from "kicking out" and will save cost of regaging and renewal of ties. On straight track it is economically worthwhile to install gage rods spaced five ties apart for reduced track maintenance costs.

Essentially, rail and rail joint maintenance consists of the maintenance of component parts previously discussed. Clean ballast, good track drainage, sound and well-tamped ties, large tie plates, adequate rail anchors, joint and splice bars, gage rods, and properly installed and fitted spikes and bolts. Therefore, a well-organized maintenance program will include the regular inspection of each track structure component.

Rail and Joint Maintenance

Improper anchorage of rails aggravate conditions known as rail battering, end overflow and chipping. Rail batter is the mashing down of the end of the rail under the hammer blows of traffic. End overflow is the projection of metal at the top of the gage side of the rail head into the gap between the rail ends. Chipping, as the name implies, is actual damage to rail surface.

Rail joints should be replaced before they become so worn as to cause heavy batter and wear at the rail ends. On sharp curves, worn rails should be transposed from one side of the track to the other before the low rail becomes so flattened as to be unfit for use on the high side.

Loose bolts tend to wear out the component parts of the joint and increase rail-end batter. They allow the bolt threads to become damaged by being battered against the web of the bars so that it is then impossible to tighten the nut. Loose bolts also increase the wear of the joint bars and rail ends. If nuts are turned too tight, traffic may strain the bolts beyond the elastic limit. Lack of uniform tightness will tend to cause a concentration or "bunching" of the space allowed for rail expansion.

Rails should regularly be inspected for proper gage and level in order to anticipate as soon as possible necessary maintenance or repair work on track structure components. Standard track levels and gages are used.

Rails are handled and re-positioned by various hand tools including rail tongs, track jacks, lining bars and track liners. The principal uses of the track jack are for raising the track in the course of surfacing, improving the grade or applying additional ballast; for sustaining the track while ties are being replaced; and for aligning track where "throwing" or moving the rail cannot be done with lining bars or track liners; and for respacing ties.

Lining bars are used when detailed track adjustments are necessary. Three types of working ends are used: pinch, wedge and diamond, each having specific advantages. The track liner is a somewhat more elaborate lining tool designed to make the throwing of track possible with the fewest number of men. With this tool, a 3-man crew can align rail up to 112 lbs, and with a five man crew heavy rail from 131 lbs up. In operation, liners do not raise the track, no digging is necessary at the ends of ties, and to clear trains, bars can be removed while the liners are left in position.

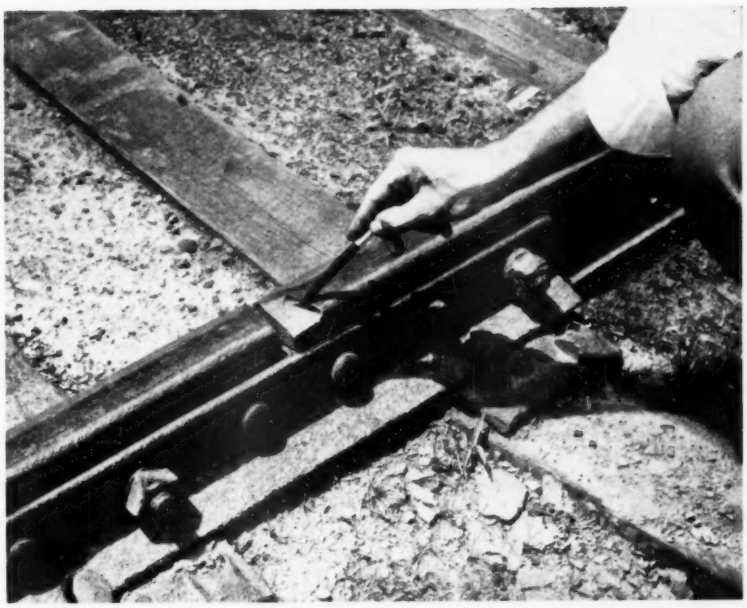


Fig. 5. Note bad break in rail, wear due to rail batter; loose spikes and bolts

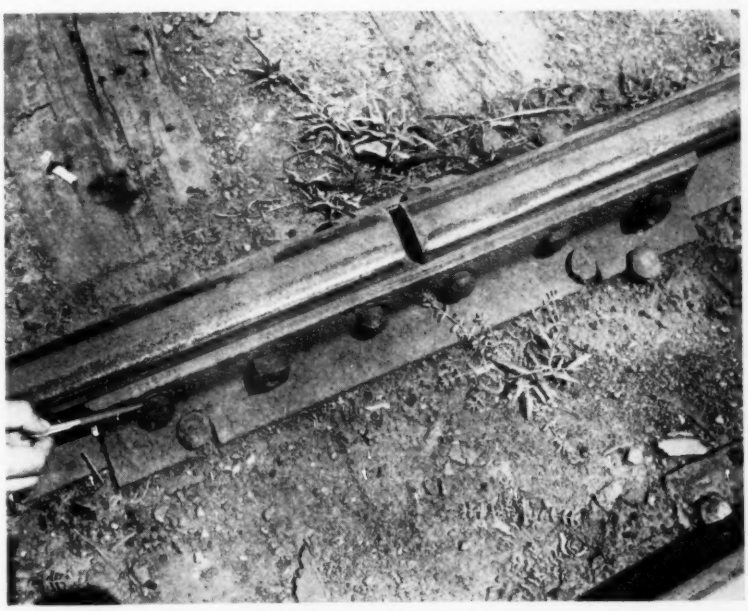


Fig. 6. Poor drainage around ties, loose bolts and excessive rail expansion at joint

Watch for the complete index to Volume 8, 1954 of Plant Engineering in the January issue

Fig. 1. Stop-weld solution is applied to metal. It keeps "painted" pattern from bonding under heat and pressure

Fig. 2. Evaporator plate is placed in hydraulic press and needle inserted to the lead-in of the stop-weld pattern

Cheaper Heat Exchangers From Aluminum "Sandwiches"

With this process it is possible to create any pattern of tubing within two sheets of metal . . . Offers such features as: Efficient Conductivity . . . Flexibility of design . . . Elimination of dies

ANY PATTERN that can be drawn on a piece of paper can be reproduced as tubing within a metal sheet.

This process is already being used by the refrigeration industry for making evaporator plates. According to the manufacturer of this process it has: (1) reduced retooling costs for new evaporator plates from $50,000 to $50; (2) cut retooling time from six months to one week; (3) lowered end product and production costs; and (4) increased efficiency of the plates by more than 25 per cent.

Here's how the process works: The flat pieces of aluminum or copper are cut to size and cleaned. With the silk screen process, the pattern that will become the tubing and other passages is applied to one of the flat sheets. The "paint" used to apply the pattern is a stop-weld material that prevents the surface painted with it from bonding to another piece of metal under heat and pressure.

The stop-weld material is applied as a painter applies paint to a stencil —squeegeed onto the metal with a rubber roller. Two sheets are then placed face to face to form a metal "sandwich." These are spot-welded to keep them together in the proper relative positions.

This metal sandwich is then heated and rolled. The first hot rolling produces a complete bond. Subsequent cold rollings reduce the sheet of metal to proper thickness.

Rolling operations elongate the pattern several times. The key to the success of this operation is to pre-plan a silk-screen pattern, which, when elongated, will result in perfectly proportioned patterns.

After roll bonding, the fused material is annealed. Everything bonds except the area where the stop-weld pattern has been applied.

After annealing, one end of the now elongated metal plate is trimmed. This bares the lead-in end of the stop-weld pattern. A needle, much like that used to inflate a football, is then inserted into the bared end of the stop-welded pattern.

The next step is to place the bonded plate between two heavy platens—flat plates of metal—in a hydraulic press. At this point, water is pumped under pressure into the sheet. The water travels all around the non-welded design—inflating it as it goes—and comes out at an exit channel. Areas where stop-welding has been applied become passageways, which are an integral part of the material.

These passageways are then flushed out and cleaned to remove the stop-weld. It is then thoroughly dried internally. The result is a labyrinth of dilated passageways which correspond exactly to blueprint specifications.

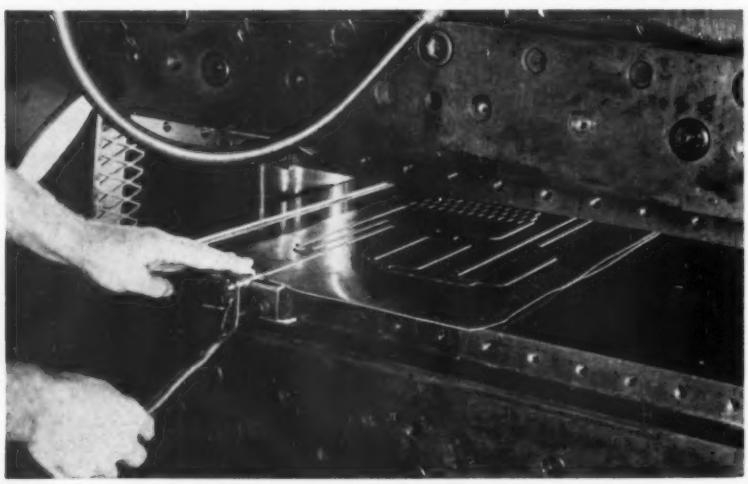


Fig. 3. Then, water is pumped under pressure into the metal sandwich. It travels all around non-welded design—inflating it as it goes—leaves via an exit channel

For Additional Information

If you would like additional information about this product, either write The Editor, Plant Engineering, 110 South Dearborn St., Chicago 3, Illinois, or indicate "Stop-Weld" on the bottom of the postage-paid cards elsewhere in this issue.

Above: Members and guests present at the third annual joint meeting of the Plant Engineers' Societies of Chicago, Calumet, Milwaukee and Northern Illinois. Right: Dick Morris, Editorial Director, Plant Engineering, poses with Bill Nelms, Abbott Laboratories (Northern Illinois); Sig Simonson, Chicago Hardware Foundry Co. (Northern Illinois); Fred Trubschaw, Galland-Henning Mfg. Co. (Milwaukee); Otto Seidl, Combustion Engineering, Inc. (Calumet); H. B. Zoeter, Continental Can Co., Inc. (Chicago); and Ted Ramond, Goodman Manufacturing Co. (Chicago)

News Roundup—Plant Engineers' Societies

AS THE NUMBER of Plant Engineers' Societies increases so will their activities. Following is a brief report of what some of these Societies are doing:

Northern New Jersey

The first meeting of the fall season of the Plant Engineers' Club of Northern New Jersey was held at Townley's Restaurant, Union, New Jersey.

After the business meeting of the organization was discussed, the guest speaker for the evening, Mr. Lou Lerder, Assistant Manager of the Training Division of Esso Standard Oil Co., gave a talk on the handling of personnel. This subject created a great amount of interest among the members, and they plan to have more subjects along this line in the future.

The next meeting of the group will discuss heaters and boilers.

Northern Illinois

The Plant Engineers' Society of Northern Illinois served as host this year for the third annual joint meeting of the Plant Engineers' Societies from Chicago, Calumet, Milwaukee, and Northern Illinois.

Following the dinner, Sig Simonson, emcee for the evening, introduced Bill Nelms, president of the Northern Illinois Plant Engineers' Society, who welcomed the plant engineers.

After the officers, members and guests were introduced, the president from each of the four societies gave a brief report of his group's activities during the past year.

Richard H. Morris, Editorial Director, PLANT ENGINEERING, presented a report on the organization of the American Institute of Plant Engineers.

Final speaker of the evening John F. Bracken, Public Service Company of Northern Illinois, gave a comprehensive talk on "Power Trends in Industry."

Dayton

Mr. Herbert D. Bangert, Jr., District Manager of the Manheim Belting Co., was guest speaker for the first fall meeting of the Plant Engineers' Club of Dayton. He gave a very interesting talk on V-belts.

The results of club's recent election were also announced: Don Smith, The Duriron Co., Inc., is the new president; J. B. Frounfelker, Airtemp Div., Chrysler Corp., vice president; and M. B. Proctor, Leland Electric Co., secretary-treasurer.

Program Committee will consist of: J. B. Frounfelker, chairman; E. R. Wray, Airtemp Div., Chrysler Corp; and V. A. Kahl, Moraine Products Div., GMC. Charles Kohl, Harris-Seybold Co., R. R. Reimer and F. Detrick, were appointed to the Membership Committee.

Boston

Seventy-four members and guests were present for this year's first fall meeting of the Boston Plant Engineers' Club.

After their regular business meeting, following a dinner at the M.I.T. Faculty Club, Dan Shea, Simplex Wire & Cable Co., introduced the guest speaker of the evening, Richard Wareham, of Louis Allis Co. Mr. Wareham gave an informative talk on the subject "Wide Range Electrical Speed Devices." Members and guests participated in the open discussion period which followed the talk.

Yearly Index

Watch for the complete index to Plant Engineering, Volume 8, 1954, in our January issue.

How To "Spare" Large Motors and Controls

A little thought, effort, planning and common-sense stocking of parts for the large motors and controls in your plant can go a long way in preventing costly shutdowns and do away with overstocking of replacement parts

By R. L. GEHRING, Electric Machinery Mfg. Co., Minneapolis

PROPER ELECTRICAL and mechanical design for the particular application, plus good protective maintenance are necessary if motors and controls are to give reliable performance on the job. Even with the best of selection and care, the effects of operating conditions, age and wear, and the contingencies of accident or improper operation must be provided for.

Friction, vibration, arcing, and the action of heat, moisture, corrosion and abrasion are all enemies of the electrical equipment; they can cause gradual or sudden deterioration. These factors cannot always be fully controlled in the operating area. Therefore, a good protective maintenance program should be reinforced and made fully effective by forward planning on replacement needs and by an adequate stock of renewed parts.

Planning Replacements

What spare parts are needed? How many should be available? The answers revolve mainly around considerations of (1) what parts are obviously essential for the normal requirements of maintenance, and (2) what additional parts are desirable to minimize downtime in case of sudden need.

I—A study of operating conditions, or a review of past records of performance needs will show what spares are desirable for regular maintenance. Frequency of starting and stopping, for example, is a factor. For a motor control operated several times a day certain parts will have to be replaced sooner and more often than where the motor is seldom stopped.

II—What is the cost of a shutdown? Some motor driven processes once started must be carried through to completion. Here you will want duplicate or interchangeable complete operating units or spares which can take over quickly. How seriously will a shutdown of a given piece of equipment decrease the plant output? The answers to this will determine what spare parts or assemblies should be available in the storeroom, ready to be installed with a minimum outage time.

III—Do you have a relatively economical alternate method of carrying on while a piece of equipment is inoperative? Time required to obtain a replacement will determine the items you will carry as spares.

Renewal Parts for Motors and Exciters—The accompanying chart, based partly on NEMA renewal parts recommendations, shows a stocking program for various types of motors.

Synchronous Motors — Brushes, brush rigging and bearings are the normal wearing parts of the synchronous motor. Armature coils and field coils provide for quick replacement in case of failure. Where there is frequent starting, and where starting conditions are difficult, spare cage bar and end-ring material or wound field poles complete with cage are good protective insurance.

Exciters do not lend themselves to easy replacement of commutators or armature coils unless complete electrical repair facilities are available. A spare exciter armature is handy for use while commutator or armature coil repairs are being made at the factory or in a service shop. Direct-connected exciters have no bearings to worry about. You will, of course, want spare belts and bearings available for belted exciters. Carbon brushes for exciters should always be on hand.

Squirrel Cage Induction Motors—Bearings are normally the only wearing part of the squirrel cage motor. Armature coils are vulnerable to severe ambient conditions or to the stresses of very frequent starting and stopping, so that spare coils are desirable for quick replacement. Where the motor uses forced lubrication a spare oil pump is desirable.

Wound Rotor Motors have brush rigging and a rotor winding in addition to the armature coils and the motor bearings. Brushes are required for normal replacement. Rotor winding spare parts provide for quick replacement in case of burnout.

Accessories for motor operation, such as blower equipment for forced ventilation, pumps for water cooling, filters and other parts should be considered in the spare parts program.

Renewal Parts for Control—First on the list are those parts that are destroyed when operated, such as fuses. These are an absolute necessity and spares should always be included with the original order.

Next contacts for relays, for switches, and for breakers and contactors wear after many operations dependent on the currents carried and severity of operating conditions. Contacts for industrial controls are not usually available locally, hence they should be stocked in all spare parts programs.

Storage of Spare Parts

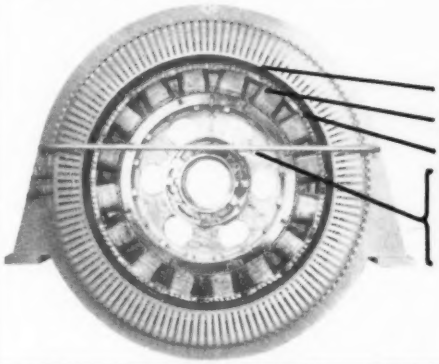
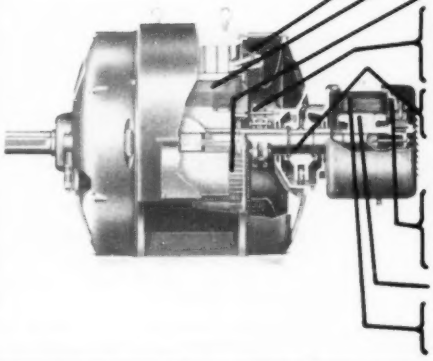
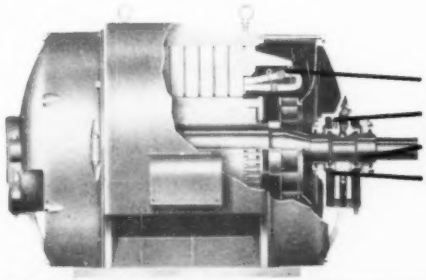
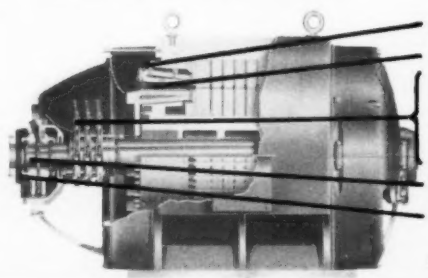
Operating coils can fail when subject to adverse temperature or moisture. Resisters, rheostats, springs, current transformers, control transformers and instruments are items which must be specially considered with respect to the operating conditions in the plant.

Keeping Spare Parts—Spare parts should be tagged with a description of the part and the equipment on which it is used. Parts should be stored in a warm dry location. Cover machined surfaces with a thin film of grease. Shelf life of coils is increased by enclosing in a sealed container with dessicant to absorb moisture.

There is substantial advantage in programing and purchasing stock requirements with the purchase of the original equipment. Coils, cage parts, field poles, bearings, and other items produced at the same time as the original motor can be bought at lower cost and in exact duplication.

Purchasing stock parts with original equipment minimizes time and effort, and insures that your spare parts will be on hand as and if needed. Telephone orders and expensive rush transportation or service costs can be minimized or eliminated by planning and ordering spare parts with original equipment.

Recommended Stock of Renewal Parts

	Number of motors	
	1 to 4	5 to 9
Engine Type Synchronous Motor		
		
Armature Coils*	1/3 set	1 set
Rotor Field Coils	1	2
Cage Materials	1 set	1 set
Brushholders and Springs	1	2
Brushholders Stud Insulators	1 set	2 sets
Brushes	1 set	2 sets
Synchronous Motor with Direct-Connected Exciter		
Motor		
		
Armature Coils*	1/3 set	1 set
Rotor Field Coils	1	2
Cage Materials	1 set	1 set
Brushholders and Springs	1	2
Brushholder Stud Insulators	1 set	2 sets
Brushes	1 set	2 sets
Bearings	1 set	1 set
Oil Rings	1 set	1 set
Exciter		
Brushholders and Springs	1 set	1 set
Brushholder Stud Insulation	1 set	2 sets
Brushes	1 set	2 sets
Armature complete		1
Shunt Field Coil	1	1 set
Interpole Field Coil	1	1 set
Squirrel-Cage Induction Motor		
		
Armature Coils*	1/3 set	1 set
Bearings	1 set	2 sets
Oil Seals, where required	1 set	2 sets
Oil Rings, where required	1 set	1 set
Wound-Rotor Induction Motor		
		
Armature Coils*	1/3 set	1 set
Rotor Coils		1 set
Brushholders and Springs	1	2
Brushholders Stud Insulation	1 set	2 sets
Brushes	1 set	2 sets
Bearings	1 set	1 set
Oil Rings, where required	1 set	1 set

*And Winding Supplies

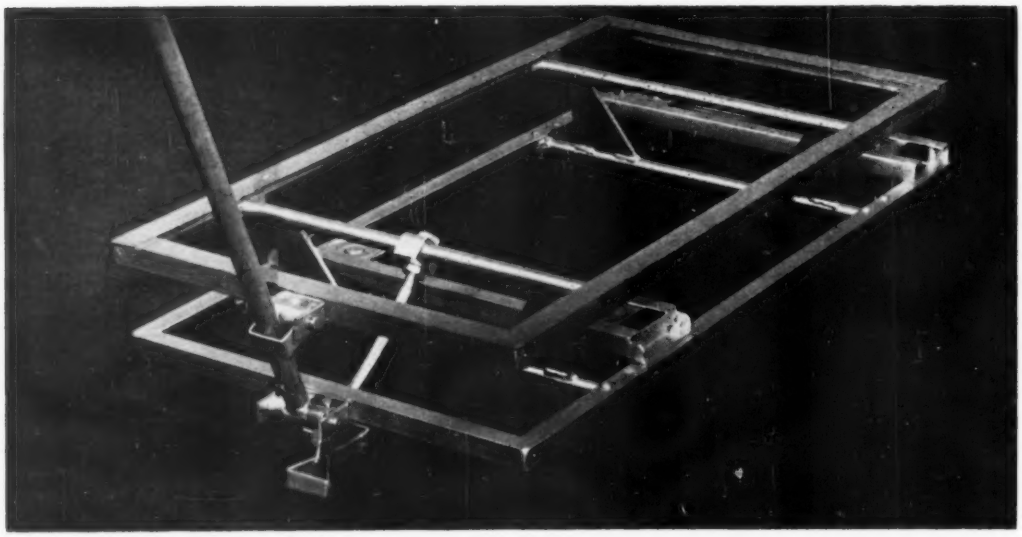


Fig. 1. This small lift, designed by A. E. Du Moulin, is supplying the muscles to help move plant equipment

Small Lift Moves Big Things

Special lift, designed by A. E. Du Moulin, supplies the muscles for moving equipment at the Minneapolis-Honeywell plant

WHENEVER a plant layout change is in the offing there is always the problem of moving desks, tables, workbenches, etc., from one place to another.

This is no longer a problem at Minneapolis-Honeywell thanks to Albert E. Du Moulin, maintenance supervisor, of the Aero Division of the Minneapolis-Honeywell Regulator Co., Minneapolis, Minnesota. He designed a special lift to simplify task of moving equipment during plant layout changes.

With this lift it is possible to mount and move pedestal desks and any other equipment up to 500 lb in one easy operation. Formerly, it was necessary to call on the services of several men to lift the desk to permit a skid or truck to be slipped underneath the desk. Now, with the Du Moulin lift, the complete operation can be handled by one man.

The lift is 22 in. wide, 44 in. long and 5 in. high with a 5 in. lift. It weighs only 70 lb and has a lifting capacity of 500 lb. Material is moved about with the help of two rigid 4 in. rear wheels and two 4 in. front wheels that swivel for turning and positioning objects being moved.

There is practically no maintenance required since it operates strictly by cam action. Outside of lubricating the bearings with a light oil only once a month, there are no moving parts to wear out.

This lift is now being manufactured by a St. Paul firm.

Fig. 2. With the lift only 5 in. high, it can be easily slipped under desk or other equipment that has to be moved

Fig. 3. Once in position, the handle is raised, lifting the desk off the floor for easy movement to its new location

Circuit Converts A-C to D-C Supply For Operating Small D-C Equipment

Many electrical maintenance shops must have a great deal of d-c equipment which could be put to good use . . . If this is the case in your plant, read how this equipment can be put back in service

By L. W. FITZPATRICK, Chief Engineer, Department of Corrections, Jefferson City, Missouri

GATHERING DUST underneath discarded parts in every plant's electrical maintenance shop are good and perfectly usable d-c motors, fans and other equipment. The stumbling block is usually the conversion of the motor for a-c operation—a tedious and rather costly operation.

Small d-c power supplies for operating such small motors from a-c circuits can easily be made up from selenium rectifiers, resistors and capacitors. Large milliampere selenium rectifiers are readily available and when coupled with a conventional 660-watt electric heater cone, provide a ready substitute for the conventional bulky, expensive, surge-limiting resistor.

The nichrome wire in the element provides excellent current regulation, as its resistance remains constant with large current variations. Ordinary lamp bulbs which have been tried in these circuits have the disadvantage of the lamp filament resistance varying considerably depending on the value of the current.

These heater cones have approximately 20 ohms resistance and this is lowered by simply cutting out a middle section of the element wire. Take care not to disturb the welded terminals at the heater base. The cut down sections are then stretched and easily mated with small bolts and washers.

This surge limiting resistor also serves as a fuse in the event of a short circuit. It limits the initial current flow and the slight voltage drop which occurs as the current peaks, and assumes a steady value as the capacitor becomes fully charged.

This half-wave rectification is satisfactory for small power applications. The ripple frequency is high as the rectifier conducts during the positive half of the input cycle, the negative half being suppressed by the high reverse resistance of the rectifier. Ripple frequency thus equals supply frequency.

With the d-c voltage output dependent on the microfarad capacity of the input capacitor and load current, large filters will improve voltage regulation and decrease the ripple component.

Small d-c power supplies of this type improve relay operation, magnetic chuck performance and other similar devices.

Operation of universal ac-dc motors on direct current, will eliminate considerable sparking at the brushes. These motors are usually a compromise between an a-c series and a d-c series motor.

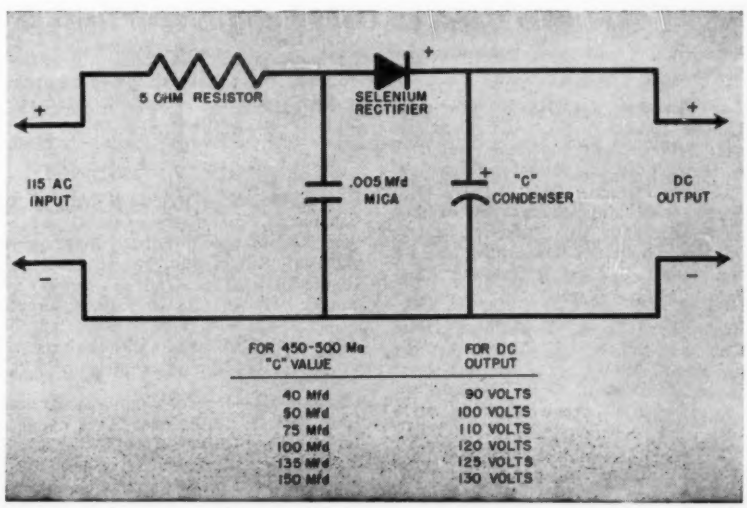
The extra sparking on alternating current is due to transformer action which induces current in each coil as it is shorted by the brushes. As the brushes cover two commutator segments, armature coils perform as the secondary of a transformer. This short-circuited condition causes excessive current, resulting in increased brush wear.

When converting a-c to d-c supply for operating d-c fans, the voltage should be limited below the normal d-c reading on the fan nameplate as the ripple can overheat the motor. In most cases, condenser experimentation to provide 90 to 100 volts d-c, provides ample fan speed without the motor overheating.

The life of ordinary electrolytic capacitors will be shortened when used in these circuits. For use with selenium rectifiers, special capacitors with etched anodes and cathodes are available. The etched cathode prevents capacity drop due to high ripple and large peak currents.

Substituting a 47-ohm, 2-watt resistor; a 65 milliampere selenium rectifier and a 22 microfarad condenser in this circuit, makes an ultra-small converter unit for a smoother, more comfortable d-c shave from an ac-dc razor.

With forced ventilation through small tube-type fans, these rectifiers can be operated up to 250 per cent of normal load current value. However, air circulation must be constant to limit rectifier temperature below its 212 F safe operating maximum.



Wiring diagram shows how this inexpensive circuit provides a small d-c power supply for operating motors, fans and other d-c equipment from an a-c circuit

NEW PLANT CONSTRUCTION — advance information on location, costs

Guin, Ala.—Minnesota Mining & Mfg. Co., St. Paul, Minn., adhesive papers and tapes, roofing granules, etc., plans new branch plant at Guin, where large tract of land has been acquired. It will comprise several one-story structures of large floor area, to be equipped for manufacture of special adhesive tape reflector materials. Cost reported close to $2,000,000.

Le Moyne, Ala.—Courtalds (Alabama), Inc., viscose rayon staple, has authorized plant expansion to double present capacity of 50 million lb of finished rayon staple per year. No official estimate of cost announced—will represent investment of several million dollars. H. K. Ferguson Co., Cleveland, Ohio, engineer-contractor, has prepared plans and will supervise construction.

Booneville, Ark.—American Hard Rubber Co., New York, N. Y., hard rubber products, plastic specialties, etc., has arranged with South Logan County Industrial Foundation, Booneville, for construction of new plant at that place, to be occupied under long-term lease. Cost estimated $265,000, exclusive of equipment. Work is scheduled to be carried out early in 1955.

Fort Smith, Ark.—Eastern Metal Products Corp., Tuckahoe, N. Y., special machinery and parts, tools, dies, etc., plans new branch at Fort Smith, to be one-story, about 350,000 sq ft floor space. Proposed to begin work at early date. Cost reported over $600,000. Final completion is scheduled before close of 1955.

Little Rock, Ark.—Kroger Co., 222 Ferry St., bakery and general food products, has preliminary plans for new one-story storage and distributing plant on local site, approximating 160,000 sq ft floor space. New unit will include a baking plant and refrigerating division. Cost reported close to $1,000,000.

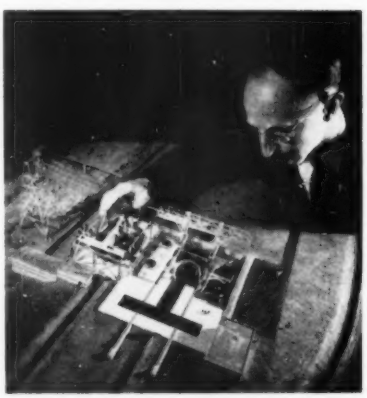
Los Angeles, Calif.—Langendorf United Bakeries, Inc., has plans for new baking plant on Gage Ave., Bell Gardens, near Los Angeles. It will be one-story, totaling about 170,000 sq ft floor space, and is reported to cost over $750,000, with traveling ovens, mixing machinery and other bakery equipment. Bennett & Bennett, Pasadena, Calif., are architects.

Bridgeport, Conn.—Bridgeport Brass Co., 30 Grand St., has plans under way for new addition to plant, one-story, about 80 x 400 ft, to be equipped for manufacture of copper kitchen utensils. Cost reported close to $1,000,000. Fletcher-Thompson, Inc., Bridgeport, is architect and engineer.

Hartford, Conn.—Bryant & Chapman, 255 Homestead Ave., milk and dairy products, has plans for new addition to plant for large increase in processing and other divisions. Cost reported over $500,000. Ebbets, Frid & Prentice, Hartford, are architects.

Hartford, Conn.—General Ice Cream Corp., 51 Walnut St., will construct a two-story addition to local plant at 255 Homestead Ave. It will be equipped for large increase in present capacity. Cost reported about $500,000. Ebbets, Frid & Prentice, Hartford, are architects.

Shelton, Conn.—B. F. Goodrich Co., Sponge Products Div., Akron, Ohio, will make extensions in branch plant at Shelton, including additional structures and installation of equipment to double present capacity. Work will be carried out over a period of several months and will represent a reported investment of about $3,000,000.



Nation's first atomic power plant at Shippingport, Pa., may look like this when completed in 1957. Westinghouse Atomic Power Division will build the atomic reactor and the plant will be operated by the Duquesne Light Co.

Covington, Ky.—Bavarian Brewing Co., 528 West 12th St., plans addition to local brewery No. 1, for increased capacity in bottling and other division. Cost reported over $1,000,000. Proposed to begin work soon.

Russellville, Ky.—Rockwell Mfg. Co., Pittsburgh, Pa., meters, valves, power tools and kindred products, plans new plant at Russellville, where tract of about 30 acres of land has been acquired. It will be one-story, about 90,000 sq ft floor space, estimated to cost over $800,000, with equipment. Proposed to begin work early in 1955.

Chicago, Ill.—Revere Copper & Brass, Inc., 2200 North Natchez Ave., copper and copper alloy, aluminum alloy and other metal forgings, stampings, etc., has completed plans for new one-story addition, about 220 by 300 ft, to be equipped for increased capacity. Cost reported about $650,000. Proposed to have structure ready for service early in 1955.

Hammond, Ind.—Standard Oil Co. of Indiana, Inc., Chicago, Ill.; and Sinclair Refining Co., New York, N. Y., plan joint construction of new plant in vicinity of oil refinery of first noted company, to be equipped for production of anhydrous ammonia, solutions of ammonia and ammonium nitrate. It will comprise several one- and multi-story units with processing and other machinery for rated output of about 300 tons per day. Cost reported in excess of $10,000,000. Proposed to have plant ready for service early in 1956.

Cedar Rapids, Iowa—Darling & Co., Chicago, Ill., commercial fertilizers, agricultural chemicals, etc., is considering construction of new plant at Cedar Rapids, where site is being secured. It will consist of several one-story structures, with processing and other equipment for sizable output. Cost estimated close to $500,000.

Louisville, Ky.—Jones-Dabney Co., Resins & Chemicals Div., 1481 South 11th St., chemical specialties for paint service, polyvinyl acetate products, etc., has plans for new three-story addition to plant, about 10,500 sq ft floor space, and will equip for expansion. Cost reported over $350,000.

Baltimore, Md.—Bethlehem Steel Co., Sparrows Point, Baltimore, has plans maturing for one-story addition to local steel mill, for production of steel plate under continuous process. Cost reported close to $1,000,000. Work is expected to begin soon.

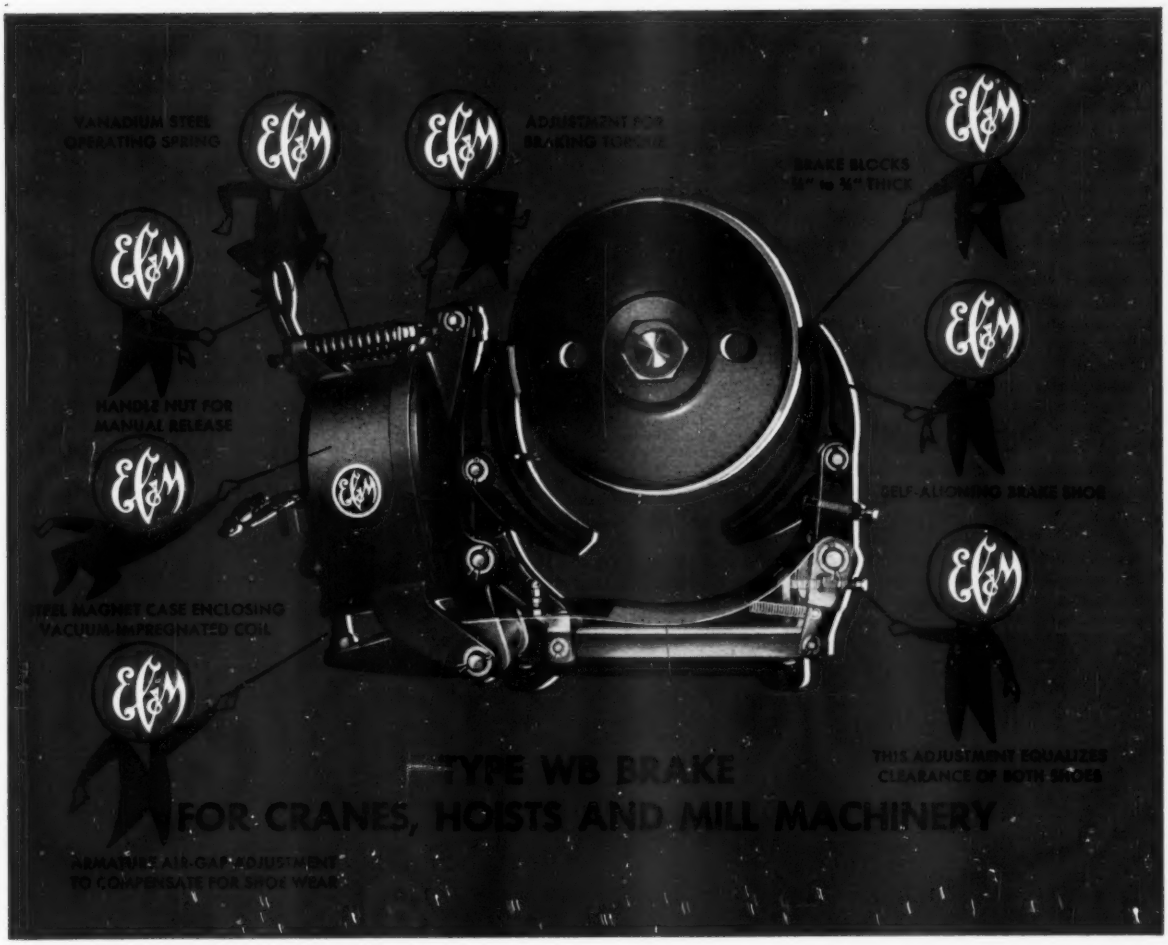
Bedford Township, Mich.—Ford Motor Co., Dearborn, Mich., has plans for new one-story motor parts plant, 240 by 360 ft, in Bedford Township. Cost reported over $700,000, with equipment. Proposed to begin work soon. Albert Kahn Associated Architects and Engineers, Inc., Detroit, Mich., is architect and engineer.

Detroit, Mich.—Stroh Brewing Co., 991 Gratiot St., has approved plans for expansion in brewery, with work to comprise a main seven-story structure for fermenting and other divisions of production. Cost over $1,000,000.

Petoskey, Mich.—Petoskey Portland Cement Div., Penn-Dixie Cement Corp., will carry out an expansion and modernization program at local cement mill, with work to include a number of new one-story buildings; installation of equipment and improvements in certain existing machinery. Entire project reported to cost about $500,000

Minneapolis, Minn.—Hoerner Boxes, Inc., Keokuk, Iowa, corrugated paper boxes and containers, plans new one-story plant at Minneapolis, approxi-

EC&M brakes are built for smoother operation • safer stops less maintenance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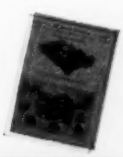

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NEW PLANT CONSTRUCTION

mating 135,000 sq ft floor space. Converting and other equipment will be installed for large capacity. Cost reported over $450,000.

Plainfield, N. J.—Stavid Engineering, Inc., 312 Park Avenue, plans to build a two-story plant, 6,400 sq ft floor space, for the purpose of electronic development research and production. Occupancy approximately January, 1955. Cost $750,000. S. Lawrence Klein, Newark, N .J., is the architect.

Astoria, L. I., N. Y.—East River Petroleum Terminals, Inc., affiliated with Preferred Oil Co., Inc., Brooklyn, N. Y., has plans maturing for new gasoline and oil terminal at Astoria, where large tract of land on Steinway Creek and East River has been secured. It will comprise several buildings, storage tanks and other facilities for a rated capacity of 600,000 bbl at one time. Cost reported about $4,000,000. Project will be carried out soon.

Webster, N. Y.—Haloid Co., Rochester, N. Y., processed photographic papers, photo-copying machines and parts, has acquired a tract of about 165 acres of land at Webster, near Rochester, for new plant, comprising several one-story structures. Proposed to begin work early in 1955. Company ultimately will move present plant to new location. No estimate of cost announced will represent sizable investment.

Black Mountain, N. C.—Kearfott Co., Little Falls, N. J., marine equipment, electronic devices, etc., plans new plant near Black Mountain, where tract of land has been secured. It will comprise a main one-story building and several smaller units, equipped for large increased output. Cost reported about $1,000,000.

Lima, Ohio—Standard Oil Co. of Ohio, Cleveland, Ohio, has approved plans for new plant for production of anhydrous ammonia and allied products, in vicinity of oil refinery at Lima. It will consist of several one- and multi-story structures, with processing and other equipment for a rating of 300 tons of ammonia and 200 tons of nitrogen solutions per day. Cost reported approximately $16,000,000. Work will begin soon and is scheduled for completion by close of 1955. Arthur G. McKee & Co., Cleveland, engineer-contractor, will prepare plans and supervise construction.

Sugar Creek, Ohio—Belden Brick Co., Canton, Ohio, brick, hollow tile and other structural clay products, plans new plant at Sugar Creek, where site has been selected. It will comprise several one-story structures, with tunnel kilns and other facilities. Cost reported about $1,000,000.

Toledo, Ohio—General Mills, Inc., 129 Dixie Hwy., flour, feed, cereal products, etc., plans new addition to food products division at plant on Laskey Rd., Rossford, near Toledo, to be equipped for manufacture of prepared cereal products. Processing and other equipment will be provided for large output. Cost reported about $1,500,000. Completion is scheduled late in summer of 1955.

Erie, Pa.—Bucyrus-Erie Co., 1202 West 12th St., cranes, draglines, power shovels, etc., has plans for one-story addition to local plant, about 45,000 sq ft floor space, to be equipped for expansion. Cost reported about $750,000. H. K. Ferguson Co., Cleveland, Ohio, is engineer.

Franklin, Pa.—Joy Mfg. Co., mining machinery for coal, metal, nonmetallic and other industries, has authorized two new one-story additions to plant, 250 by 360 ft and 220 by 560 ft. Cost reported over $2,000,000. Proposed to begin work soon. H. T. Osborn & Co., Franklin, is architect.

Marcus Hook, Pa.—Sun Oil Co., Philadelphia, Pa., refined petroleum products, gasoline, etc., has authorized expansion in petrochemical div. plant at Marcus Hook, to be used for production of anhydrous ammonia. Work will comprise several one- and multi-story structures, with installation of processing and other equipment for rated output of about 300 tons of ammonia per day. Cost reported about $9,000,000. Completion scheduled for late 1955.

Pittsburgh, Pa.—Jones & Laughlin Steel Corp., 401 Liberty Ave., has authorized an expansion and improvement program at local steel mill, and branch works at Aliquippa, near Pittsburgh. Work will comprise a number of new buildings and installation of equipment for considerable increase in present capacity. Work is scheduled to begin early in 1955. Project will represent a reported investment of close to $50,000,000.

Memphis, Tenn.—Hart's Bakery, Inc., 647 Madison Ave., has authorized plans for new baking plant on local site at Summer Ave. and Henden Hall Rd. It will be one-story, equipped for large output. Cost reported about $300,000. Proposed to begin work early in 1955.

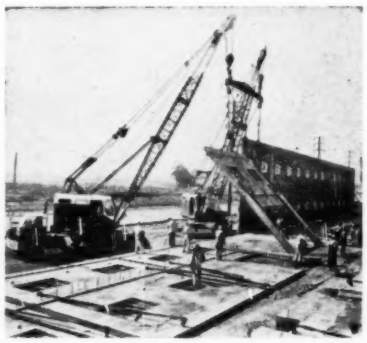
Dallas, Tex.—Upjohn Co., Kalamazoo, Mich., drug and pharmaceutical products, plans new branch plant at Dallas, to be one-story, about 35,000 sq ft floor space. Cost reported close to $450,000. Austin Co., Chicago, Ill., engineer-contractor, is engineer and will supervise construction.

Henderson, Tex.—Henderson Clay Products Co., brick, hollow tile and other structural clay products, has authorized expansion in plant to increase capacity from 60,000 to 120,000 units per day. Work will comprise several new structures, with tunnel kiln and other facilities. Cost reported about $500,000.

Provo, Utah—Consolidated Western Steel Div., U.S. Steel Corp., San Francisco, Calif.; and Columbia Geneva Div., U.S. Steel Corp., San Francisco, affiliated organizations, have plans in progress for expansion in Geneva Works of last noted division at Provo, to be equipped for production of electrically welded steel pipe for natural gas, oil products, etc. It will consist of several one-story buildings, reported to cost in excess of $4,000,000.

New Martinsville, W. Va.—Mobay Chemical Co., care of Monsanto Chemical Co., St. Louis, Mo., recently organized as a subsidiary interest, has plans for new plant near New Martinsville, where tract of about 200 acres of land has been acquired. It will comprise a series of 12 one- and multi-story buildings, equipped for processing special chemicals for use in manufacture of plastics, adhesives, etc., on basis of about 300 tons per month. No official estimate of cost announced—reported in excess of $3,000,000. Proposed to have plant ready late in 1955.

Granville, Wis.—Evert Container Corp., Granville, near Milwaukee, has approved plans for new one-story plant, about 100,000 sq ft floor space, for manufacture of corrugated paper containers. Cost estimated in excess of $850,000. Proposed to have ready for service early 1955. John P. Bruecker & Son, Milwaukee, are architects.



Large, pre-cast, reinforced concrete panels are placed in position at new warehouse of Northrop Aircraft, Inc., in El Segundo, California. The tilt-up panels are 25 by 30 ft and weigh 37 tons

Manitowoc, Wis.—Eastman Mfg. Co., 12th St., hydraulic hose assemblies, couplings for hose for air, water, gas, etc., has approved plans for new plant on local site, to be one-story, 200 by 200 ft, with several smaller adjoining structures. It will be equipped for increased capacity. Cost reported in excess of $450,000. Austin Co., Chicago, Ill., engineer-contractor, has prepared plans and will supervise construction.

Milwaukee, Wis.—Peck Meat Packing Corp., 300 South Muskegon Ave., meat processing and packing, has plans for new one-story addition for increased capacity. Cost about $300,000.

Saved → $16,000.00 in one year

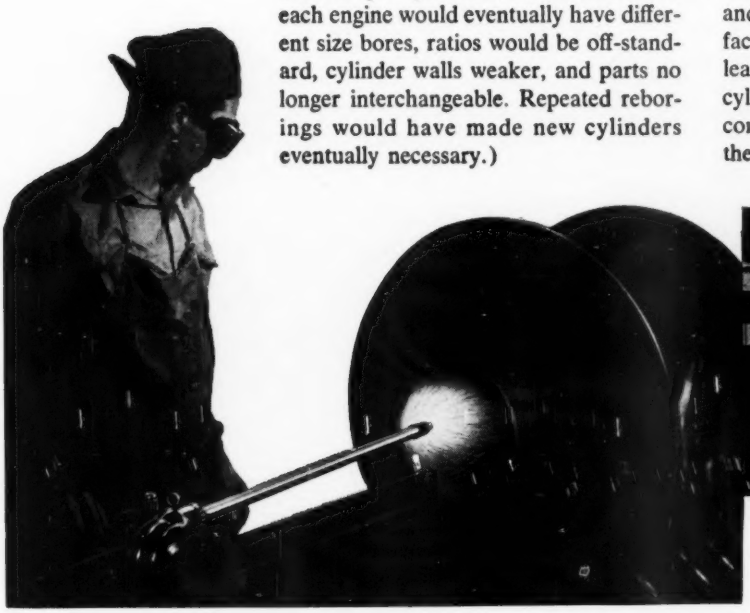
How one plant saved $16,000.00 in one year on one type of machine repair, with metallizing.

This large mid-West chemical plant uses fourteen gas engines, in compressor service, operating 24 hours a day. Fuel is a mixture of hydrogen, methane and air, with charcoal dust added to increase combustion efficiency.

Three methods of reconditioning these engines were available;

1. the cylinders could be replaced and standard sizes of other components preserved, at a cost of $450.00 per cylinder;
2. the cylinders could be rebored and fitted with oversized pistons and rings, at $400.00 per cylinder. (With this method, each engine would eventually have different size bores, ratios would be off-standard, cylinder walls weaker, and parts no longer interchangeable. Repeated reborings would have made new cylinders eventually necessary.)
3. Metallizing, at $125 to $150 a cylinder.

Cylinders are bored, threaded, grit-blasted, degreased and sprayed with Metcoloy #2 Stainless Steel, 20 to 30 pounds being applied. Cylinders are then finish-machined and honed to size. In the first year 64 cylinders were re-surfaced at a total saving of about $16,000.00, over the unsatisfactory method of reboring and fitting with oversized rings and pistons—$19,200.00 over the cost of new cylinders. Past experience with the greater particle hardness of sprayed metal, its better lubrication characteristics and the superiority of the stainless steel surface over the original cast steel cylinders leads this user to estimate that the rebuilt cylinders are good for another 15 years of continuous operation, about 50% more than the original life before reconditioning.



ABOVE: Gas engine — cylinders reconditioned with metallizing.

LEFT: Gas engine cylinder — being metallized while rotating in improvised jig set-up.

See other examples of metallizing illustrated in our 8-page Bulletin in your Sweet's Plant Engineering File — Section 7a/Me.

Just One Example. This is just one among many money-saving applications of metallizing in this plant. Almost any rotating or sliding machine part subject to wear, can be reconditioned with this modern repair process. Parts are kept to standard sizes, replacement stocks can be cut, and production "downtime" caused by delivery delays or shortages of new parts is eliminated.

Further Information. Send off the coupon for a call by a factory trained Metco Field Engineer, or a copy of Bulletin 51B, "Metallizing—Its Practical Applications."

The following trade names are the property of Metallizing Engineering Co., Inc., Metco, Metcoloy *Reg. U.S. Pat. Off.*

DON A. WATSON
METALLIZING ENGINEERING CO., INC.
1145 Prospect Ave., Westbury, Long Island, N. Y.

☐ Please have Metco Field Engineer call.

☐ Please send me, without obligation, "METALLIZING SAVES MONEY".

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Company_____

Street_____

City_____ Zone____ State_____

METCO

Metallizing Engineering Co., Inc.

1145 Prospect Ave., Westbury, L. I., New York · cable: METCO

In Great Britain:
METALLIZING EQUIPMENT COMPANY, LTD.—Chobham near Woking, England

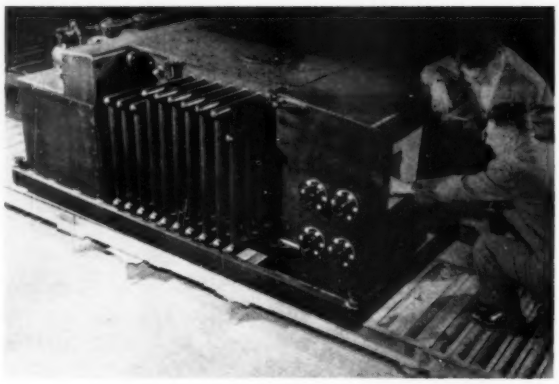
For more facts circle 553 on Reply Card

Compact Portable Load Center Takes Power into Tungsten Mines

SPECIALLY-DESIGNED for use in subterranean mines, a portable load center was shipped recently to Sominar for Los Condores Mines, Argentina, by the General Electric Company's Distribution Transformer Dept., Pittsfield, Mass.

Wide surface skids welded to the base structure facilitate dragging the load center through mine passageways. Internal bracing and extra heavy lifting lugs permit lowering the unit by one end, down a mine shaft. Dustproof construction and low height add to its adaptability.

The load center will be used for supplying power to mining equipment at the Argentine company's tungsten mines. Rated 150 kv, 2400-400Y/231 volts, the transformer is filled with non-flammable Pyranol dielectric. Minimum center of gravity was obtained by use of a compact low height core and coil structure, and overall height was held to only 42 in., less than half the height of a conventional 150-kv load center. The unit is 103 in. long and 48 in. deep.

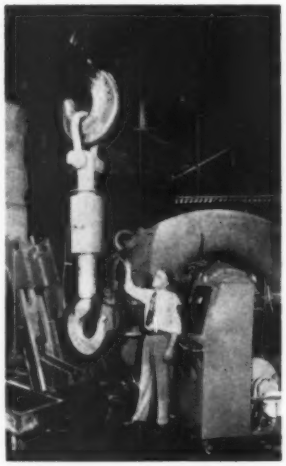


Crane Scale Weighs "On the Hook"

AN ELECTRIC SCALE CRANE of 50 tons capacity accurately weighs huge parts at General Electric's West Lynn, Mass. plant. The unit consists of a Baldwin Type SR-4 tension type load cell, of 100,000 lb capacity with a clevis and a load hook.

Weighing accuracy is within 0.2 per cent, for loads up to 15 tons.

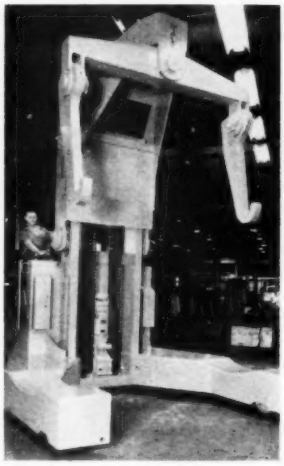
A supporting cradle for the unit, plus a dolly-mounted indicator and its connecting cables, complete the assembly, which was built by Baldwin-Lima-Hamilton Corp.



Straddle Truck Handles Hot Load

LADLE-TRANSPORTING problems at the Aluminum Co. of America have been solved by a special 20,000 lb capacity high lift crucible handling electric straddle truck. Built by Yale & Towne Mfg. Co., Philadelphia, the truck has an overall height of 154 in., with a maximum lifting hook height of 103 in.

A diesel-electric unit provides electric power to drive the truck wheels and operate the hoisting mechanism. Operator visibility is improved and driving flexibility provided by the use of dual controls.



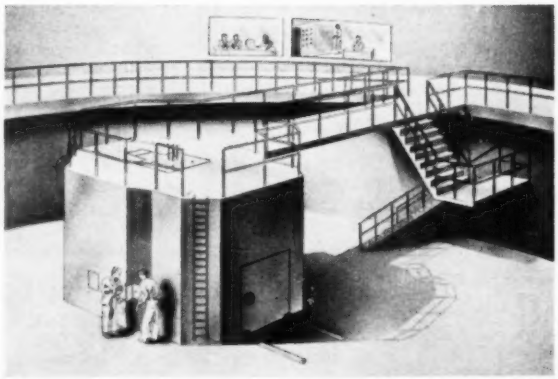
Construction of First Industrial Research Nuclear Reactor Announced

PROMISING TO BE A MAJOR ADVANCE in the technology of the Chicago area, the first nuclear reactor for industrial research will be established at Armour Research Foundation of Illinois Institute of Technology, Chicago.

The proposed reactor, designed for 50,000 watts, is specifically a highly flexible neutron and gamma source, and is not intended for research on reactors themselves nor for the generation of electrical power, according to Dr. Richard F. Humphreys, manager of the physics research department.

Surrounded by 2500 sq ft of working area to accommodate experimental setups, the reactor will possess a maximum of ports and a large thermal column for convenience in irradiation and other uses.

The reactor room will be a gas-tight steel tank, approximately 60 ft in diameter and 25 ft high. It will be adjacent to laboratories for handling and storing radioactive material.



40

reasons why
any service requiring
BRONZE GATES
can be planned for
lasting economy

Look over the list of 40 patterns in Jenkins' complete line of Bronze Gates. You'll find the valve you need in this new folder, with details of the *extra value* design and construction that makes Jenkins the best buy for any service. Get this folder, use it to plan your hookups for lasting valve economy.

FOR ANY SERVICE---THERE'S A JENKINS BRONZE THAT WILL LOWER MAINTENANCE---LAST LONG
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DIFFERENT GATES TO VALVE SATISFACTION
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300 lb. — 350 lb. PATTERNS
including
SOLID WEDGE
SPLIT WEDGE
INSIDE SCREW
OUTSIDE SCREW AND YOKE
STATIONARY SPINDLE
TRAVELING SPINDLE
SCREW-IN BONNET
BOLTED BONNET
UNION BONNET
QUICK OPENING
SOLDER END
SOCKET END
plus RADIATOR HOSE END
and UNDERWRITER GATES
SOLID WEDGE TRAVELING SPINDLE
SOLID WEDGE SCREW IN BONNET TRAVELING SPINDLE
SOLID WEDGE STATIONARY
SPLIT WEDGE UNION BONNET TRAVELING SPINDLE
SOLID WEDGE UNION BONNET TRAVELING SPINDLE
SOLID WEDGE OUTSIDE SCREW & YOKE RISING SPINDLE
SOLID WEDGE OUTSIDE SCREW & YOKE RISING SPINDLE
SWINGTITE
FAST ACTION LEVER GATE
SELECT THE GATE YOU NEED FROM THIS COMPLETE ASSORTMENT
SOLID WEDGE BRONZE GATES
SPLIT WEDGE BRONZE GATES
Jenkins BRONZE GATE VALVES

GET THIS NEW BRONZE GATE FOLDER

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JENKINS VALVES

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SOLD THROUGH LEADING DISTRIBUTORS

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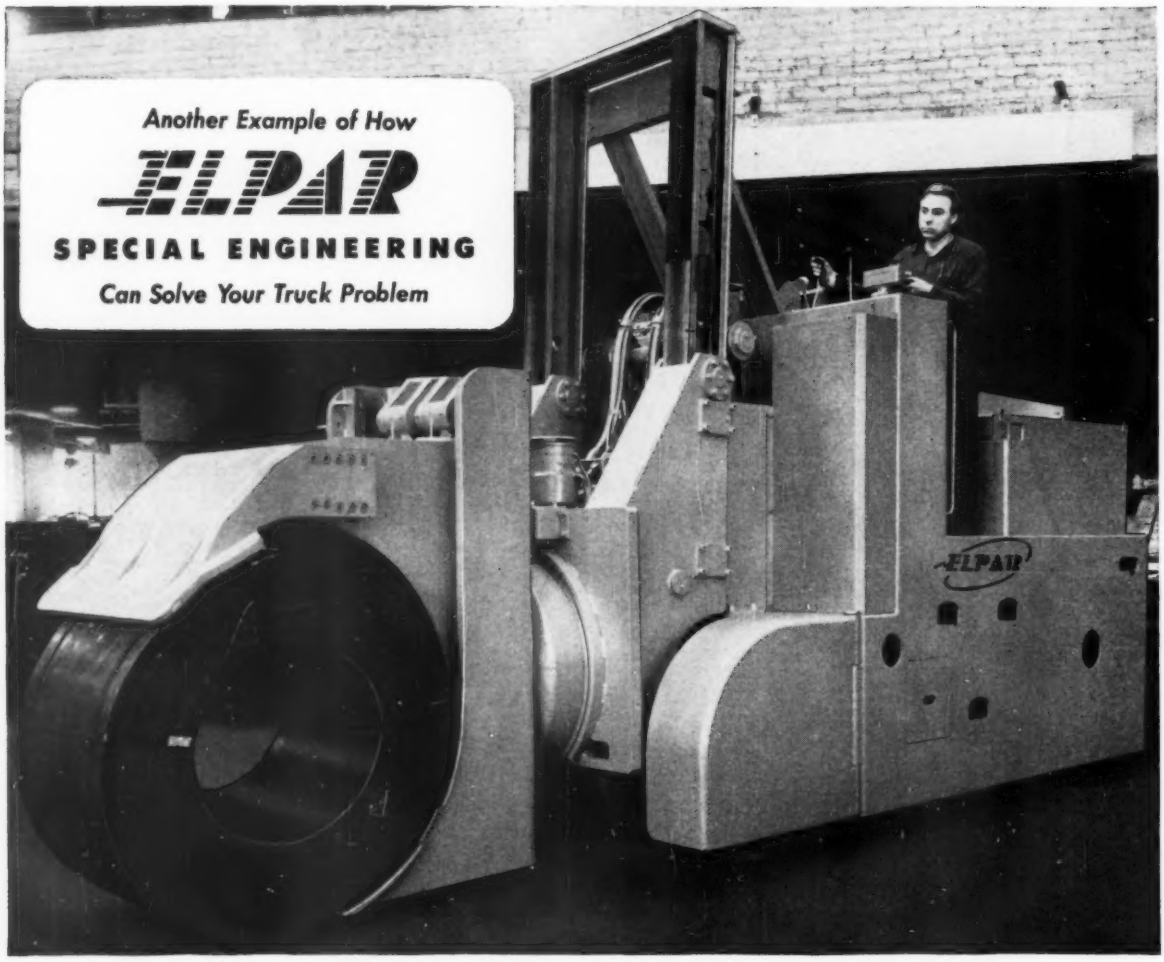

Clamping Down on Handling Costs

The Problem

Steel mills needed a *more flexible* means of handling coils of strip with industrial power trucks. Coils could be carried in only one position on the conventional ram. Yet much processing equipment throughout the mill required that the coils be placed in other positions. Thus, expensive rehandling was often necessary.

The Solution

ELPAR ENGINEERS developed a special clamp attached to a heavy duty rotating head on the truck. This clamp can pick up, carry and deposit coils horizontally, vertically, or at any intermediate position. It grasps the coils firmly, but does not distort them or mar their surface. Coils of varying width and diameter can be handled.

The Results

An entirely new and more versatile concept of handling has been introduced in steel mills. Coils are now fed to equipment in precisely the position desired. Stacking can be done so as to get more steel on the same floor area. Such improvements lower handling costs.

This is just one more example of how ELPAR "special" industrial trucks can save you money. When a standard ELPAR model will not suffice, take advantage of the ELPAR Special Engineering Service for your handling problems. It is available without cost.

WRITE TODAY!

Get this new booklet which explains ELPAR Special Engineering Service in detail. The Elwell-Parker Electric Company, 4180 St. Clair Ave., Cleveland 3, O.

ELPAR
INDUSTRIAL TRUCKS

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ONE THING LEADS TO ANOTHER

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COOLING TOWERS
AIR COOLED HEAT EXCHANGERS
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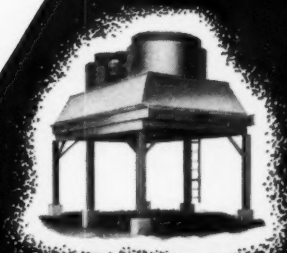
Representatives in Principal Cities from Coast to Coast

Efficient production demands modern facilities. These facilities require top-performing equipment.

That's why your installation needs a superior cooling tower . . . like this heavy-duty Pritchard unit that cools the condenser circulating water for this modern power plant.

Hundreds of industrial power and process installations demonstrate the dependability of Pritchard to meet the exacting requirements of vital cooling operations anywhere along your production line.



You'll obtain maximum heat transfer . . . with maximum savings . . . in many process cooling operations from Pritchard QUINTAIR* heat exchangers. The induced draft design assures high efficiency with more even distribution of air over the coils carrying the product to be cooled or condensed.

*Registered Trade Name

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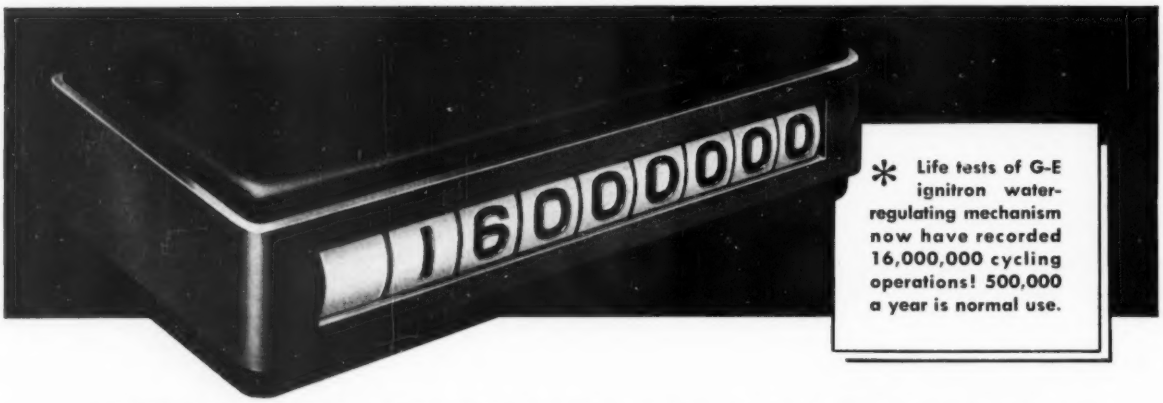

* Life tests of G-E ignitron water-regulating mechanism now have recorded 16,000,000 cycling operations! 500,000 a year is normal use.

TESTS EXCEEDING 30 YEARS' USE* SHOW ON-OFF CYCLING STILL 100%

. . . with G-E Temperature-controlled Ignitrons!

WELDER USERS: you cannot match this proved long-life dependability anywhere in the field of water-regulated ignitrons! Add these General Electric tube plusses:

Instant-operating thermostat and switch that guard against ignitron overloading and burnouts. There is no metal linkage between cylinder wall and thermostat to cause a dangerous time-lag through thermal inertia.

Equally fast switch reset when a temperature reduction of only 4 or 5 degrees has occurred. Means quick return of welders to service . . . less production time lost.

Precision temperature control. Reference point for thermostat is the average heat of tube inner cylinder wall—not temperature of a single small area of the wall which might be a cold or hot spot.

High operating limits of G-E ignitrons permit their use at full ratings . . . without tripping . . . at any reasonable circulating-water temperature. Your welders stay in service with a minimum of interruptions.

* * *

G-E Temperature-controlled Ignitrons are the most efficient welding tubes you can buy. Tremendous water savings (95% and better) . . . fast and dependable switch-off when burnouts threaten! Life equals or exceeds that of standard G-E ignitrons.

You receive tube and controls in *one integrated unit,* built throughout by G. E., carrying full G-E warranty, with a single manufacturer's responsibility to back up the product.

Get the complete story from your G-E tube distributor! *General Electric Company, Tube Department, Schenectady 5, New York.*

G-E Temperature-controlled Ignitrons for welding include:

GL-6346 . . . Size B. Will replace GL-5551/FG-271.
GL-6347 . . . Size C. Will replace GL-5552/FG-235-A.
GL-6348 . . . Size D. Will replace GL-5553/FG-258-A.

Progress Is Our Most Important Product

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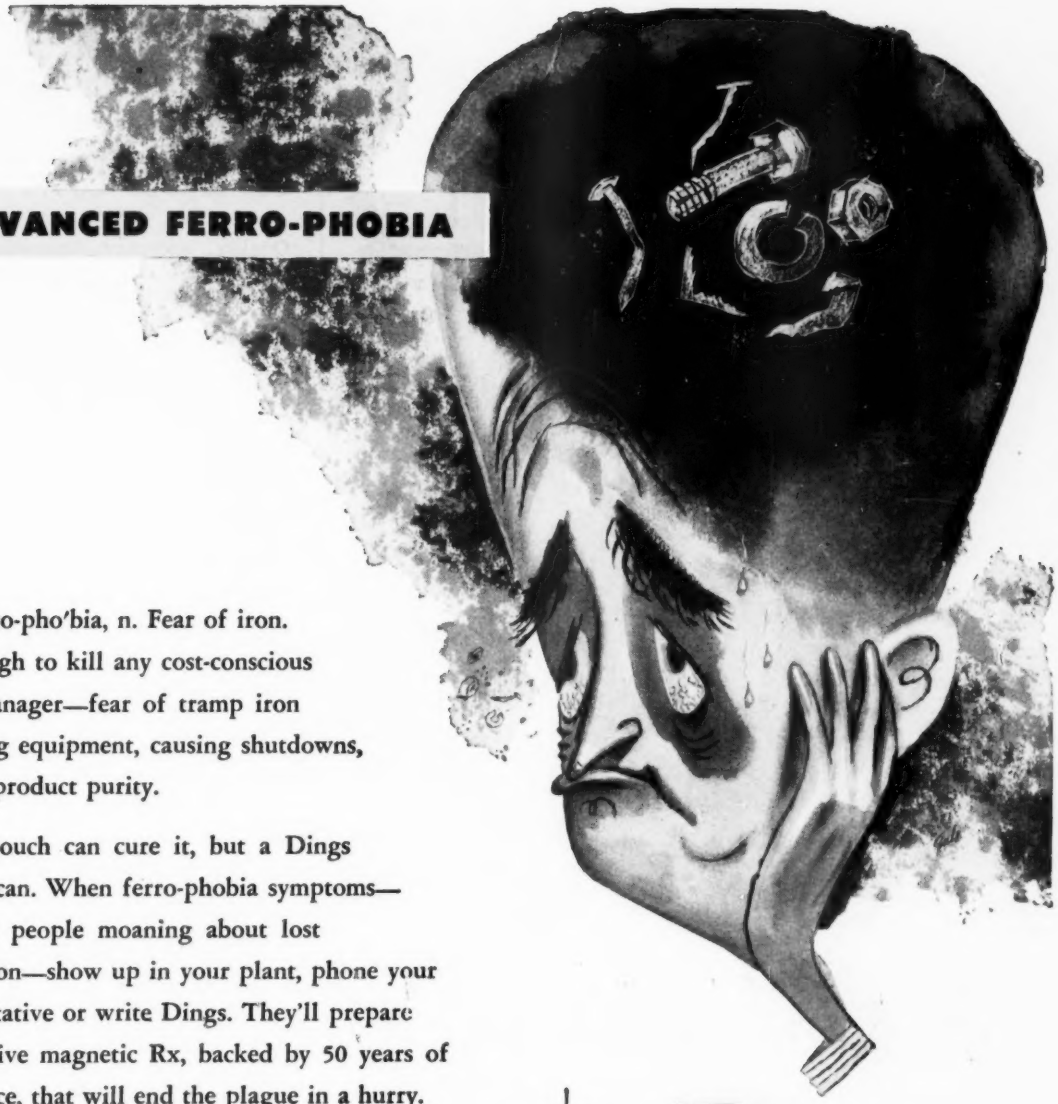
ADVANCED FERRO-PHOBIA



. . . Fer'ro-pho'bia, n. Fear of iron. It's enough to kill any cost-conscious plant manager—fear of tramp iron damaging equipment, causing shutdowns, ruining product purity.

No couch can cure it, but a Dings Magnet can. When ferro-phobia symptoms—unhappy people moaning about lost production—show up in your plant, phone your representative or write Dings. They'll prepare an effective magnetic Rx, backed by 50 years of experience, that will end the plague in a hurry.

We Wiped Out the Plague in Texas—With this "super" 3-stage magnetic hump built for one of the nation's biggest plastic manufacturers. It separates iron contaminated polyethylene pellets from iron-free pellets.

Powerful, non-electric Dings Perma-Plate magnets stop iron in the hump, chutes or ducts. Magnetic strength guaranteed forever.

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Please send me Catalog C-1205-B on Dings Perma-Plate Magnets and Catalog C-5000-B with data on the complete Dings line.

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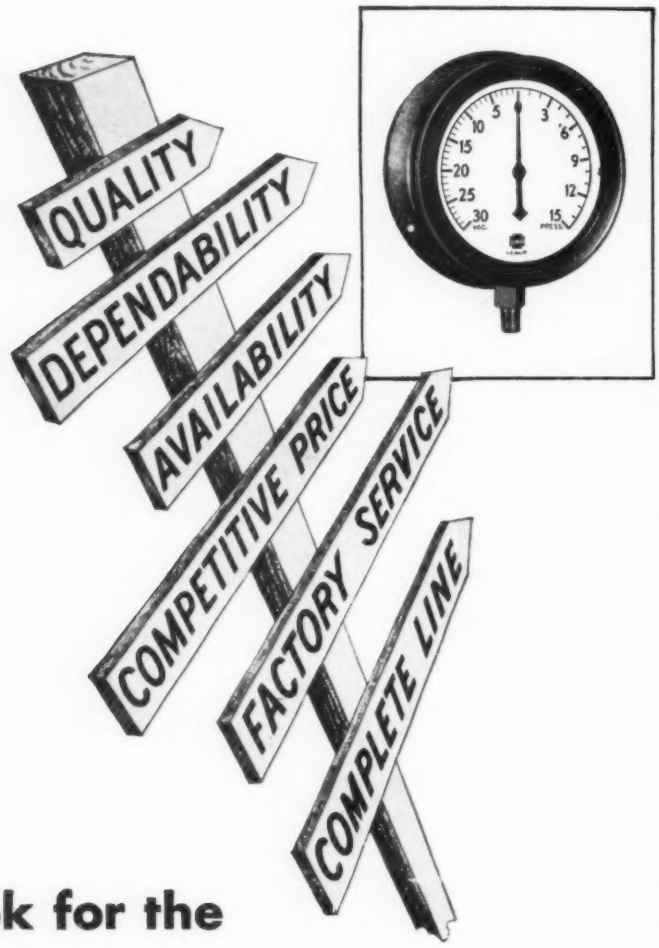

Look for the USG Plus Factors when buying gauges

Over and above mechanical features—*quality* . . . assurance of sustained high accuracy . . . long, trouble-free service . . . are most important. But, availability and price are also important.

When you buy USG gauges, you're assured guaranteed satisfaction in enduring accuracy, performance, dependability and price. For over 50 years, USG gauges have been renowned for their high accuracy and dependability—more original equipment manufacturers specify USG than any other make.

USG stocks for your convenience over 200,000 standard gauges of all types. See your USG Distributor for all your gauge requirements. More than likely, he can supply you with any quantity of gauges you want for any application, directly from his stock.

UNITED STATES GAUGE

Gauge Headquarters
for over 50 years

United States Gauge, Division of American Machine and Metals, Inc., Sellersville, Penna.

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USG'S MODERN RESEARCH LABORATORY HELPS INDUSTRY CUT GAUGE COSTS

Quality, accuracy, immediate availability, price—these are important factors in gauge buying.

Equally important, however, is assurance that gauges will perform with lasting dependability. USG provides that assurance by testing under simulated operating conditions in its Research Laboratory. Annually, these USG tests save customers hundreds of thousands of dollars in superior operating performance and less down time, not to mention eliminating more frequent gauge replacements.

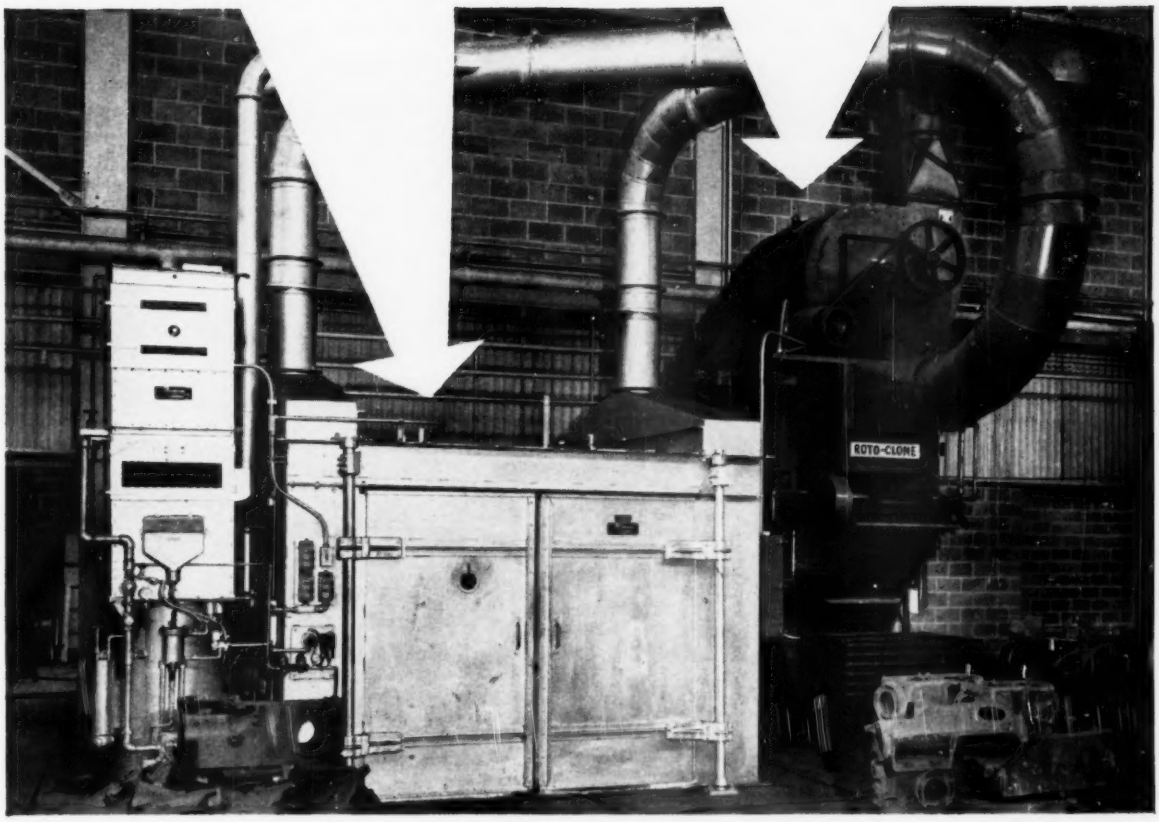
Constant testing of materials under all kinds of operating conditions and pressures is one of the many reasons why USG gauges are renowned for their enduring accuracy and dependability. USG assures this accuracy and dependability in lot after lot by employing in its manufacture the most rigid quality control system in the instrument industry.

Higher quality gauges at competitive prices are made possible by USG because its facilities are economically integrated for large volume quality-controlled production. It provides further savings to industry by stocking the world's largest, most complete line of gauge components to meet practically any pressure sensing and indicating need. From these components USG engineers often make special gauge designs, at practically stock costs, to meet individual operating conditions.

Gauge for gauge—in every application classification—*in every price class*—USG has more to offer than any other make gauge.

Above, a portion of USG's Research Laboratory. Here constant testing of materials under customer operating conditions assures optimum efficiency and long gauge life.

Here's where DUST STORMS START and STOP



Type N ROTO-CLONE
Snuffs Out Dust Threat of Abrasive Cleaning Room

The dust storms created in this abrasive cleaning room never live to see the light of day. The reason is pictured at the right—a Type N ROTO-CLONE.* Exhausting the dust as fast as it is generated, this hydro-static precipitator converts it quickly into a harmless sludge.

This is but one of many types of abrasive cleaning operations where the Type N is keeping dust "under wraps". Its high cleaning efficiency results from the combined action of centrifugal force and thorough intermixing of water and dust-laden air.

There's no secondary dust problem as the material is collected as a sludge for easy disposal. And, as is evident from the picture, the Type N's compact design makes for important space savings.

Complete dust control costs no more, often less, than half-way measures. For complete information on Type N application to abrasive cleaning operations, call your local AAF representative or write for Bulletin 277.

**ROTO-CLONE is the trade-mark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.*

American Air Filter
COMPANY, INC.

American Air Filter of Canada, Ltd., Montreal, P. Q. • 228 Central Avenue, Louisville 8, Kentucky

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"Look Into" the latest complete data on

FUSES

FOR EVERY PURPOSE

To help you solve confusing fuse problems, Economy Fuse & Mfg. Co. has just issued a convenient, pocket-size folder that tells you exactly the right fuse for practically any purpose. This handy folder illustrates and describes all the latest fuse developments and lists capacities, sizes, prices, etc. Electrical contractors, and commercial, industrial or domestic fuse users, can obtain copies from their electrical dealer or wholesaler. "For Fuse Economy Use Economy Fuses."

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Your Electrical Wholesaler has ECON Dual-Element Cartridge Fuses in stock.

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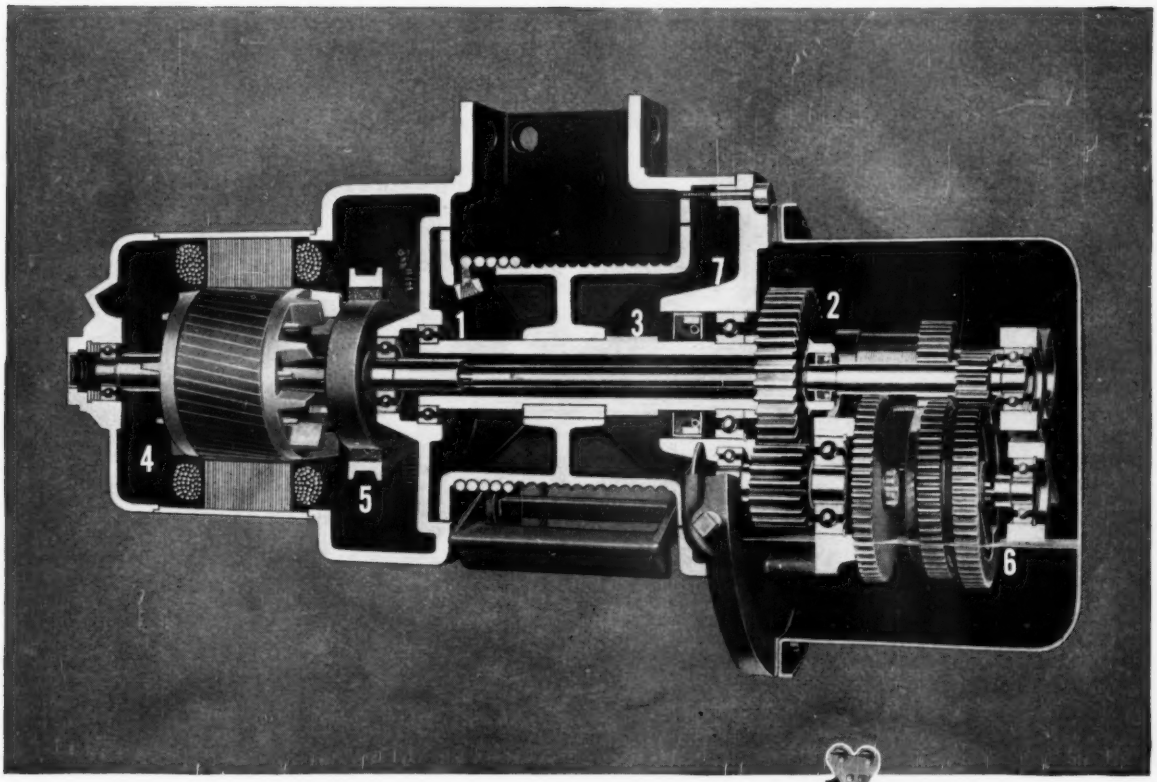

WHY ROBBINS & MYERS "J" HOISTS LAST LONGER

First—because they are built to "big hoist" standards of precision and strength to insure more years of trouble-free life. Here are seven points to prove it: Nine oversize ball **BEARINGS (1)**; hook block also has a sealed bearing sheave. Wide faced **GEARS (2)** heat treated for maximum hardness, longest wear. **SHAFTS (3)** precision ground of high carbon or alloy steel. Special Robbins & Myers high torque hoist duty **MOTOR (4)**. Die cast aluminum rotor; two dips and two bakes on windings. Rating: 30 minutes, 55° C temp. rise. **MOTOR BRAKE (5)** on motor shaft, oversize shoes for long life, quick stops, no drift. Oversize **LOAD BRAKE (6)**, Weston-type, runs in oil. Single unit aluminum **FRAME (7)** ribbed for extra strength, jig bored for accurate alignment. Type "J" hoist capacities from 500 to 4000 lbs. Prices start at $268.00.

☐ Send Bulletin 851-B ☐ Have representative call

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ROBBINS & MYERS INC.

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NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

1—LARGE PANEL, of press molded fiber glass

The Kingsize Chem-O-Glas Building Panel measures 12 ft by 4 ft and has ¾-in. deep ribs every 8 in. apart. This press-molded fiber glass panel is so manufactured that the end of every sheet is tapered to fit into each overlapping sheet, company points out, and this greatly simplifies installation. The panel is announced as flame resistant, shatterproof and color permanent. It is available in a variety of colors, and in flat as well as ribbed type. Chemold Co.

2—PNEUMATIC TUBES come in install-it-yourself kits

This prefabricated two-station pneumatic tube system comes in kit form for installation in any type of building by regular maintenance personnel. By packaging the system in kit form, manufacturer offers a pneumatic tube system at the cost of the equipment alone. Cost of the kit, which asembles into a system connecting points up to 130 ft apart, is around $525. It is pre-engineered so that the user can lay out and install the unit by following instructions provided.

Messages are moved through the tubes in air-propelled carriers at 20 ft per second, it is stated, and carriers may be sent as often as every 10 sec. Included in the kit are expanded end steel tubing, bends, terminal valves, receiving chutes, hardware for assembling and installing the equipment, message carriers, and a cabinet unit containing a ½-hp motor and exhauster to create the airstream. The exhauster has reserve capacity to power carrier runs of up to 500 linear feet, says company, and all equipment is standard so that additional parts can be obtained. Lamson Corp.

3—FUSE CUTOUTS feature design flexibility

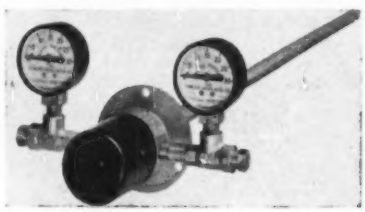
In this new line of enclosed fuse cutouts all operating functions are available in one basic design. The flexibility is accomplished with one housing and four interchangeable doors in each voltage and current rating. The choice of doors provides for normal duty indicating or dropout, normal duty indicating non-dropout, indicating heavy duty or extra heavy duty, and disconnect functions.

In addition to flexibility of operation, the new line will have other advanced design features including; broad-faced, high-pressure V-wedge contacts that are free-aligning, and self-wiping to assure low contact resistance and better alignment; and compression clamping of the mounting support to porcelain housing.

The new cutouts, which help provide distribution system and apparatus protection against short circuits and overloads, are now available in voltage ratings of 5.2 kv and 7.8 kv, in continuous current ratings of 50 amp and in all applicable NEMA Standard interrupting current ratings. General Electric Co.

4—TEMPERATURE CONTROL, low cost, pneumatic type

An inexpensive non-bleed pneumatic temperature control is announced for operation of diaphragm valves, damper motors, and other types of control equipment. Known as the Limitem, it is a differential



expansion type control designed for precision regulation of heating, cooling, ventilating, air conditioning, dew point control and industrial processes. Temperature range of the control is from 35 to 135 F. Manufacturer says the graduated dial permits quick, easy adjustment—sensitivity can be adjusted from ⅛ to 2 psi per 1 deg temperature change—gradual acting. Body is 1¾ in. OD and average bulb length 18 in. with ⅜ in. pipe or flange connection. It is available with direct action only. More details are in Bulletin 308. The Powers Regulator Co.

5—ELECTRICAL CONDUIT, heavy duty, of rigid steel

Superduct is especially designed to provide long life under the severe corrosive atmospheres found in many industries. Tests are reported to show that this heavy duty, rigid steel conduit withstands attacks of sufuric acid, caustic lye, salt spray and heat. Superduct is galvanized by company's sherardizing process, then coated with a vinyl chloride copolymer, pigmented and plasticized finish, inside and out. This new finish is designed to protect the galvanized conduit against unusually corrosive influences. National Electric Products Corp.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 145-146.

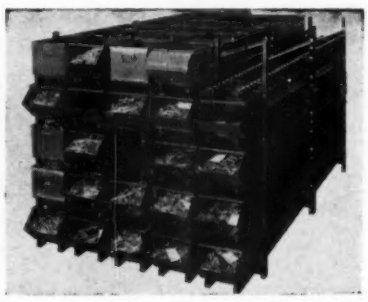
6—ROOF VENTILATOR has safety advantages

An automatic roof ventilator, the Pyrovent is reported to operate during power failure as well as under normal conditions. It not only serves to keep plant air clean, but also becomes an automatic escape valve for smoke, heat and gases in case of fire or explosion. The Pyrovent includes a fan, exhaust stack with damper flaps and an electric thermostat for the detection of fire. Company explains that in case of fire, the fan is automatically started when the rate of temperature rise exceeds 15 deg per minute, or when thermostat limits are reached. Should power failure occur, damper flaps open to provide an exit for smoke, heat or gases present.

The Pyrovent is controlled by start and stop pushbuttons which operate the fan and damper flaps. Both fan and dampers are powered by individual motors. This ventilator will come in sizes 24- to 72-in. fan diam, in direct and belt driven. The Harvey P. Bertram Co.

7—HANDLING RACK for "conveyorized storage"

Combining gravity wheel track with rack components, the Rapistan Flow-Rack cuts inventory and handling steps, says manufacturer. Through use of gravity force



this rack moves goods to the front for ready selection. By reducing the aisle space required for shelving or bins, Flow-Rack is said to provide greater useable storage in smaller area, and puts a greater selection of materials within instant sight. It can be installed by a plant's own crew, is readily assembled or taken down. It requires no walls or supports.

Flow-Rack is made of rolled steel with baked-enamel finish. It is produced in

60 cents buys how much of his time?

Let's assume your current piping maintenance labor rate, including burden, is $3.85. Less than 10 minutes is all you would get for 60 cents. Time to write a valve repair ticket and gather up tools—no more!

40—60—80 cents—it's a small difference in the price of valves that often makes the big difference in quality—*and your ultimate cost!* The thrifty buyer takes no chances with "bargain" valves and high maintenance. He knows a single valve failure can cost many times more than the dubious saving on the purchase of many valves.

It's safer . . . more economical . . . more sensible to stay with Crane quality. There's no better assurance of low-cost dependability on the job. That's why more Crane valves are in use than any other make.

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For more facts circle 564 on Reply Card

NEW PRODUCTS

(Begins on page 110)

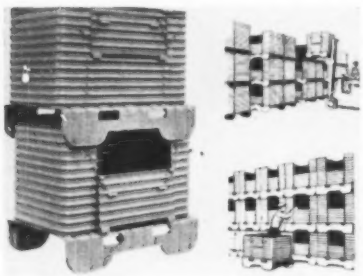
6-ft rack height for normal reach, but may be any width or length and is adaptable to the nature of the product. An installation can be extended to increase volume capacity by adding more bays. According to company, it costs less than a gravity conveyor, only slightly more than wooden bins. Specifications and a sample of actual components are offered. The Rapids-Standard Co., Inc.

8—WALL TILE CEMENT is resin type adhesive

For use in the installation of polystyrene and other non-ceramic types of wall tile, this resin type adhesive is claimed to have excellent bond strength, easy spreading characteristics with economical coverage, long open time and high resistance to moisture, mold and mildew. Accelerated aging tests at 158 F are reported to show less embrittlement than many cements, indicating lasting toughness, says manufacturer. The Flintkote Co.

9—SKID BOXES, drop doors, aid stock handling

Announced as offering easy selection of stock through accessible drop doors and



quick, convenient pick-up by fork truck, these corrugated skid boxes are of heavy duty all-welded construction. They may be built to any size and load capacity to user's specifications. Palmer-Shile Co.

11—FLUORESCENT FIXTURE for use in corridors

Available in one- and two-lamp units, the styling and simplicity of the Corridor Light make it blend with almost any architectural environment, according to manufacturer, and it is particularly effective when mounted in continuous rows. The rapid-start fixture is suggested for stairways, washrooms, hallways, and in storage areas; it is useful where continuous lines of light from a compact source are needed. A one-piece molded plastic shield is designed to afford excellent light and color transmission. The shield can be removed without tools.

Knockouts are provided for either pendant or surface mounting. End tear-outs for continuous row mounting create a continuous wire-way the entire length of the installation. Made of 20-gage cold rolled steel, the fixture is finished in company's Miracoat, a high temperature baked enamel. The reflectivity is given as not less than 86 per cent. The fixture is equipped with high power factor ballasts. Sylvania Electric Products Inc.

12—ALUMINUM SIDING for industrial buildings

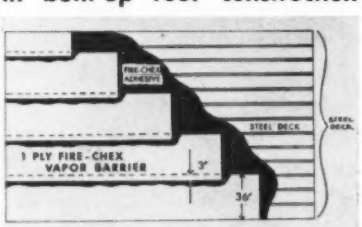
Alcoa Ribbed Industrial Siding offers a high quality appearance for low cost industrial buildings, says manufacturer. The new siding sheet is intended primarily for use on frame type structures, but it can also be used as a facing sheet on concrete block buildings. Its ribbed design is achieved by trapezoidal corrugations. The siding is available in lengths to 18 ft. This offers a stuccoed effect which diffuses light.

Conventional fastening methods are used to apply the aluminum sheets. For application to structural steel framework, Widman fasteners, self-tapping screws, Nelson Rivweld studs and other fasteners can be used. On masonry structures the ribbed sheet can be applied with expansion type fasteners or those fired from powder-actuated guns. Two sheets can be used for "sandwich" wall construction with a center layer of glass fiber insulation. The new siding is available in 0.032 in. thickness and from 5-ft to 18-ft lengths. Aluminum Co. of America.

10—VAPOR BARRIER for use in built-up roof construction

Fire-Chex Vapor Barrier is announced as a flame resistant asbestos-plastic vapor barrier for built-up roof construction. Tests are reported to show that it checks the melting and flowing of asphalt through joints in the steel roof deck when exposed to intense fire from the underside. The materials used in this vapor barrier do not melt and flow under heat, it is explained, but instead form a skeletal mat which remains in place—and thus blocks melted asphalt from the roof itself from flowing through the joints.

Company points out that Fire-Chex is only slightly higher in total applied cost than asphalt-and-felt type vapor barriers, and is less costly than many types of vapor barriers. It can be specified for

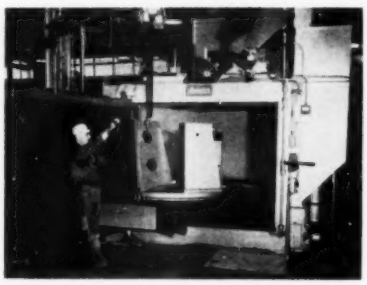


use with any type of built-up roof over steel; approval for use over decks other than steel is expected by company. The new vapor barrier weighs 60 lb per square, comes in rolls 38 ft long and 36 in. wide. Specifications performance data available. Philip Carey Mfg. Co.

To receive product data circle item number on the handy Reader Service Cards provided on pages 145-146.

13—BLAST CLEANER is airless table-type unit

Differing from many swing-table-type airless blasting machines in that it requires no pit for the abrasive hopper, the 72-in. Wheelabrator Swing Table is built for floor level installation. It has a 40-in. work height clearance and handles a wide range of work. Intended for cleaning castings, forgings, heat treated parts,



weldments, or stampings, the table can hold either a few large pieces, or hundreds of small parts.

According to manufacturer, the most important feature of this machine is the 72-in. diam plain work table mounted on the door. When the door is opened, the work table comes out into the room for ease in loading and unloading. When the door is shut, the table automatically moves into the blasting zone and rotates the work under the abrasive blasts from a rotating bladed wheel mounted in the cabinet roof. Centrifugal force alone propels the abrasive, it is pointed out, and the blasting is automatic. Loading can be done rapidly by means of auxiliary tables, handled by lift truck or jib crane. Special vestibules are availalble in the walls of the machine for accommodation of occasional long pieces. American Wheelabrator & Equipment Corp.

14—WOUND-ROTOR MOTOR is enclosed, fan cooled

Announced as bearing the Underwriters' Laboratories label, this explosion proof motor is believed to be the first rib-type enclosed fan-cooled wound-rotor motor to be made with slip rings, bushing rigging, rotor and stator inside a single frame enclosure. It is available at 1800 rpm and slower speeds, in frames 284 to 505, in standard enclosed or explosion-proof construction. In general, the new motor is applicable where very low starting current, high starting torque, smooth acceleration, jogging or variable adjustable speed dictate the use of a wound-rotor motor—and where moist, dirty, corrosive or hazardous atmospheres require a totally enclosed one.

The frame of this motor has an extended front end to include the slip rings, brushes and brush rigging. The elongation provides added surface for heat dis-

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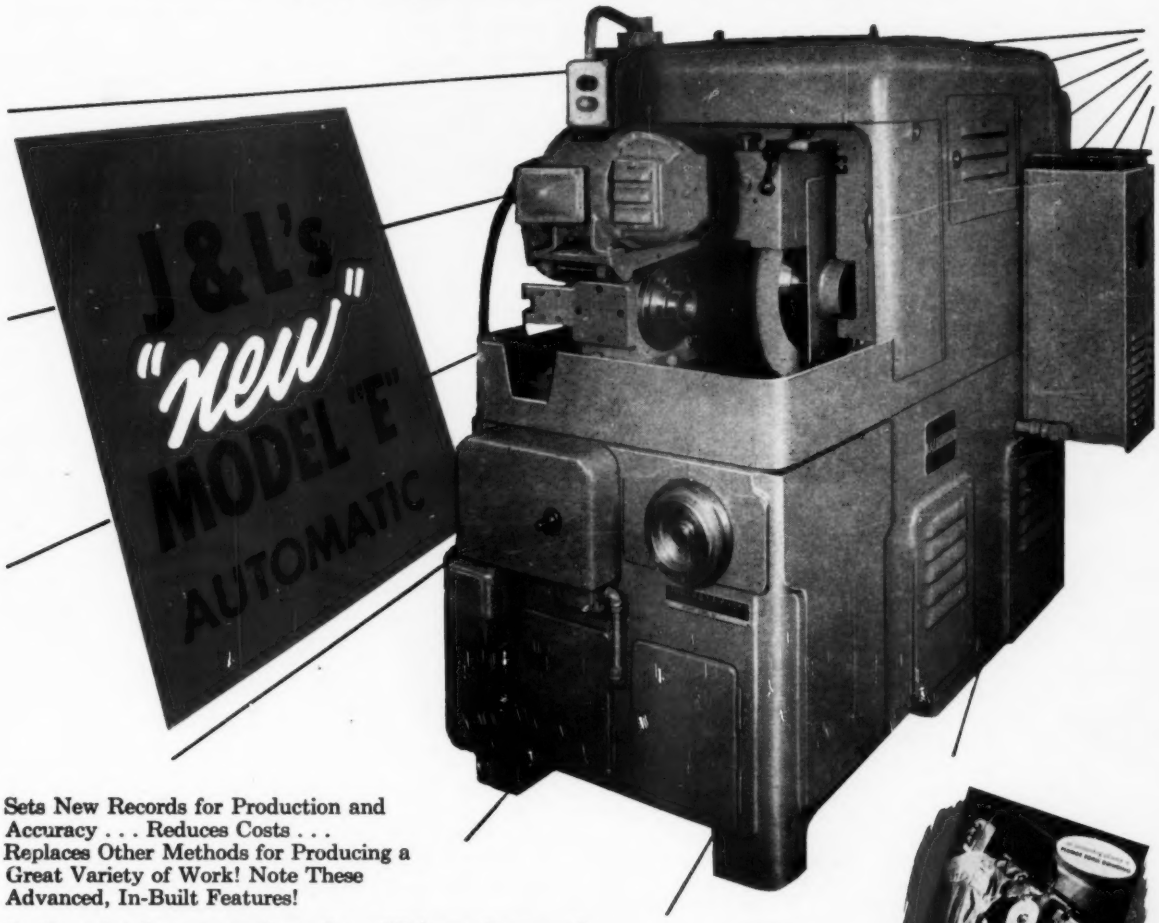

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- **Completely automatic cycle** — High speed approach, wheel feed spark out and withdrawal are positively controlled through simple cam action — ensuring constant, uniform operation under all conditions.
- **Automatic positive size control** — The wheel slide is held against positive stops with uniform hydraulic pressure.
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- **Automatic or manual handling.**
- **Complete versatility** — chucking work, center work or shoe-type grinding; crush wheel or diamond trueing.
- **Compact design** — affords exceptional accessibility and simple set-ups.

Write for illustrated folder — gives complete specifications and examples of how the Model "E" does jobs faster, better and more economically.

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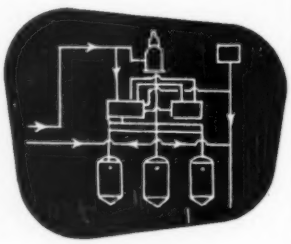
For more facts circle 565 on Reply Card

How to select a PROTECTIVE COATING

CHECK RESISTANCE TO CORROSIVE MEDIA

How well a coating withstands the action of a given corrosive agent is the first factor you must necessarily consider in choosing the right coating for your needs — but it's *only* the first.



CHECK ADAPTABILITY TO SERVICE CONDITIONS

The second factor — and one you can't always predetermine by laboratory test — is on-the-job performance. That's governed, in turn, by the kind of metal you're protecting . . . the condition of the surfaces . . . how the equipment is constructed . . . conditions encountered during its operating cycle . . . during idle periods — considerations that must be surveyed in detail before you can select a protective coating with reasonable assurance it will successfully meet your requirements.

Dampney equipment-engineered coatings give you that assurance because they are formulated to do certain selective, specialized jobs both large and small, difficult and routine — to give you the protection that is right for you — not in a costly, custom-made material nor an all-purpose anti-corrosive, but in a coating *engineered for the equipment it is to protect.*

Dampney's industrial equipment knowledge is yours to call upon freely. Let us put it to work on your next coating problem.

MAINTENANCE FOR METAL

THE DAMPNEY COMPANY

BOSTON 36, MASSACHUSETTS

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NEW PRODUCTS

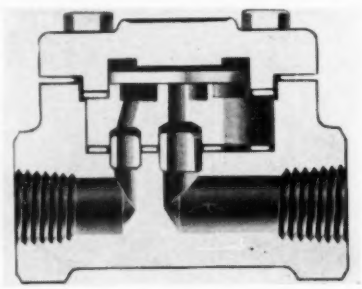
(Begins on page 110)

persal. Removal of two large pipe plugs from the upper quadrants of the frame on the slip-ring end provides large openings for maintenance work, adjustment of brushes. Slip-ring leads enter a separate cast-iron conduit box and the lead opening in the frame is sealed. Construction features are described in Leaflet 51R8195. Allis-Chalmers Mfg. Co.

15—STEAM TRAP is simple thermodynamic type

In this new steam trap, the kinetic energy of steam closes the valve. The only moving part is the valve head—a solid stainless steel disc. This assures practically no maintenance, says manufacturer, and same head and seat serve for pressures to 600 psi, temperatures to 950 F.

Operating characteristics of the thermodynamic trap are announced as follows: It closes tight on no load and



operates against a back pressure up to 50 per cent of its inlet pressure. It discharges condensate at saturated steam temperatures as rapidly as it forms. Also, according to company, this trap can vent large volumes of both air and air-steam mixtures. The starting load capacity is high, but the trap is reported to operate equally well with light loads or no load.

Design and metals utilized in this steam trap enable it to withstand superheat, water-hammer, vibration and corrosive condensate, it is pointed out. Extremely compact, the 1-in. size of the trap is only 3½ by 4¾ by 4 in. high. Bodies are cast semi-steel, carbon or moly steel with screwed, socket weld or flanged connections. Bulletin 355 gives full details. Sarco Co., Inc.

16—VACUUM CLEANER is a 7½-lb industrial unit

Described as a rugged, versatile, high powered vacuum machine capable of wide and varied service, the Model 700 has capacity and maneuverability for oversize cleaning jobs in congested areas. It is also suitable for pipe line installations, materials, conveying or special product applications, says manufacturer, and it is built for heavy duty continuous service. The 7½-hp motor drives a five-stage turbine unit that will handle not only dirt, but also metallic parts, liquids, chemicals, foodstuffs. Even abrasive ma-

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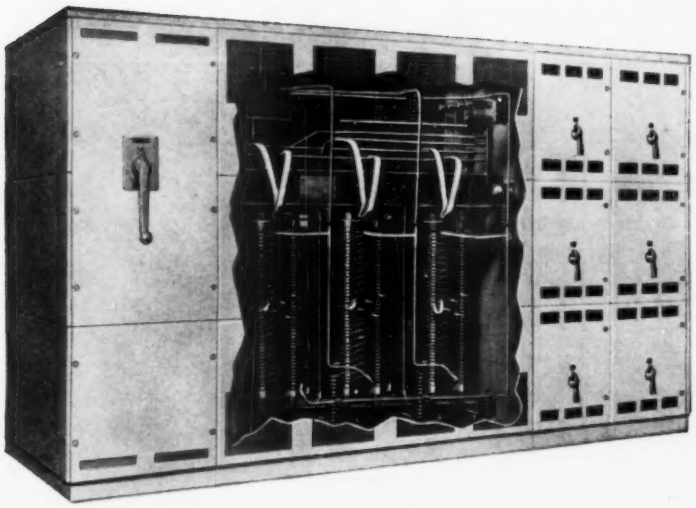

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- **you** save **job engineering costs**
- **you** get **full Wagner Quality with switchgear of your choice**

Wagner "Predesigned" Dry Type Substation Transformers are carefully engineered for dependable load-center service. Predesigning completely eliminates individual job engineering . . . reduces your costs . . . and saves shipment time.

Wagner "Predesigned" Dry Type Transformers consist of standardized core and coils rated from 112.5 to 2000 kva. They are designed for indoor installation in dry, clean, well-ventilated locations. All unit substation builders have the information and coordination necessary to use these transformers with switchgear of your choice.

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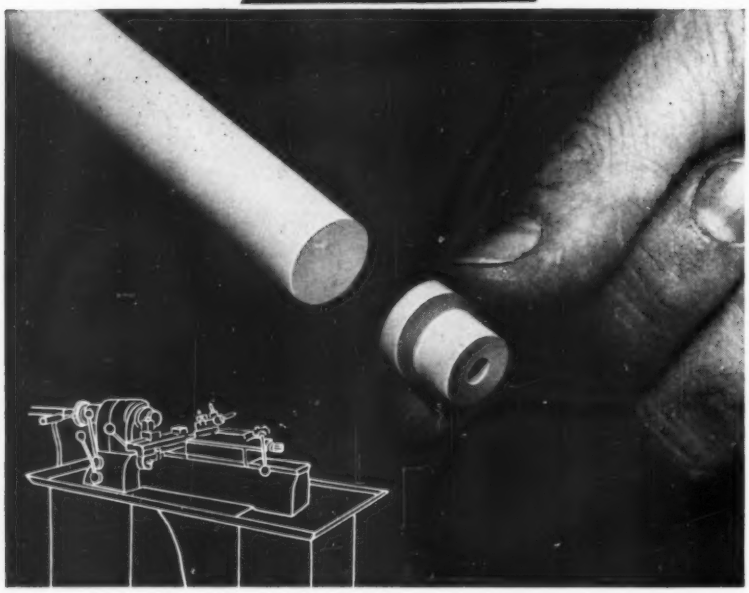

Nylon Parts Machined in Your Own Shop Can End a Host of Maintenance Problems

• Now it is economically possible to use nylon repair parts that last longer . . . need no lubrication . . . don't score contacting surfaces . . . and put an end to backlash, noise or corrosion. All it takes is POLYPENCO nylon rod, tubing, strip or slab plus the metalworking tools in your own shop. From these stock shapes, it's easy to make gears, bearings, bushings, cams, rollers and many other parts. Since expensive molding dies are eliminated, you can make one part or hundreds with the same economy. You also get these advantages:

- Easy machining—no special operator training or skill required
- Technical help in using and fabricating POLYPENCO nylon shapes
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- Uniform high quality in every piece

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*Trademark for DuPont tetrafluoroethylene resin

For more facts circle 568 on Reply Card

NEW PRODUCTS

(Begins on page 110)

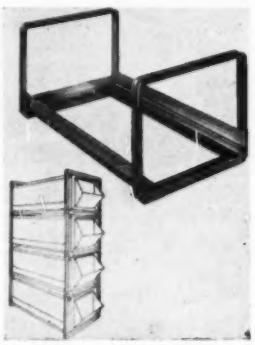
terial presents no problem, it is claimed, because separation precedes the vacuum producer. The machine is 54½ in. tall, can be rolled by one man, company says, and is adaptable to special jobs. The Invincible Vacuum Cleaner Mfg. Co.

17—DIRECT BURIAL CABLE helps combat corrosion

Offered as an aid in the battle against corrosion of buried metallic structure, is the Type CP Cable. When used in cathodic protection equipment, this direct burial cable is reported effective in refineries, steel substructure in chemical plants, and around power plants and substations and similar installations. CP Cables are available in Sizes 8 through 4/0, single conductor, 600 v. They can be of either a rubber-Neoprene construction (Durasheath), or all plastic, with polyethylene insulation and red PVC jacket. Anaconda Wire & Cable Co.

18—STACKING RACK comprised of individual units

This stacking rack is actually made up of individual units which can be asembled as many tiers high and sections wide as



required. The individual units lock together without tools—the bottom channels fit snugly over the top channel of the unit below and lock together. The boxes slide in and out like drawers to provide easy access to material stored. Lyon Metal Products, Inc.

19—ARC WELDING PROCESS uses consumable electrode

Higher welding speeds, better quality welds, and lower operating costs are chief benefits announced for a new consumable-electrode, inert-gas, arc welding process. Tests are reported to show it offers a 15 to 20 per cent faster welding speed at a 25 to 50 per cent lower costs than many manual and semi-automatic inert-gas methods. Key to the process is a coated wire (West-ing-arc MS-20), company says, and its greatest benefits are derived when used with a newly designed welding gun, welding feed-wire control, and d-c arc welder—all components of the new welding system.

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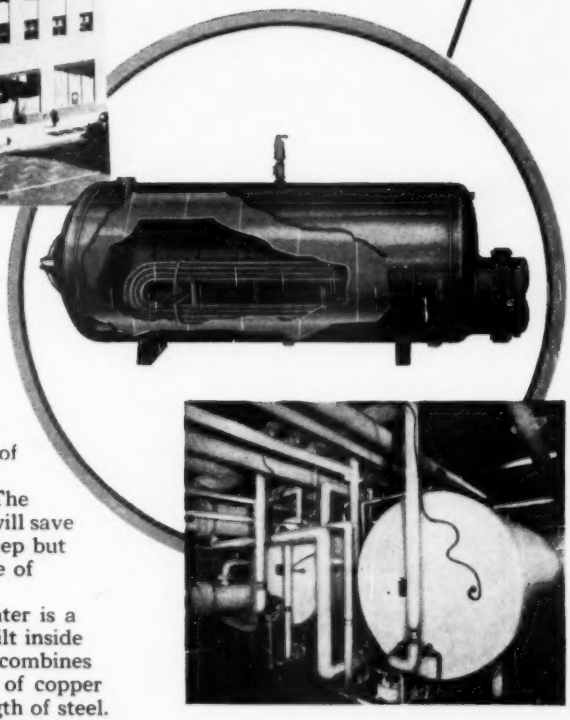

Copper-lined water heaters manufactured by **p-k** are a sound investment, especially for big, modern buildings such as the Dun and Bradstreet building. In their new office building at 99 Church Street in New York City, these copper-lined storage heaters supply 180 deg. F. water for the cafeteria and 130 deg. F. for general use. An abundant supply of rust-free hot water is constantly available at the turn of a spigot. The flawless operation of the heaters will save money—not only in heater upkeep but also in the proper maintenance of building services.

The **p-k** copper-lined heater is a complete copper heater built inside of a heavy steel shell. It combines non-corrosive properties of copper with the superior strength of steel.

For an unfailing source of pure, rust-free hot water—

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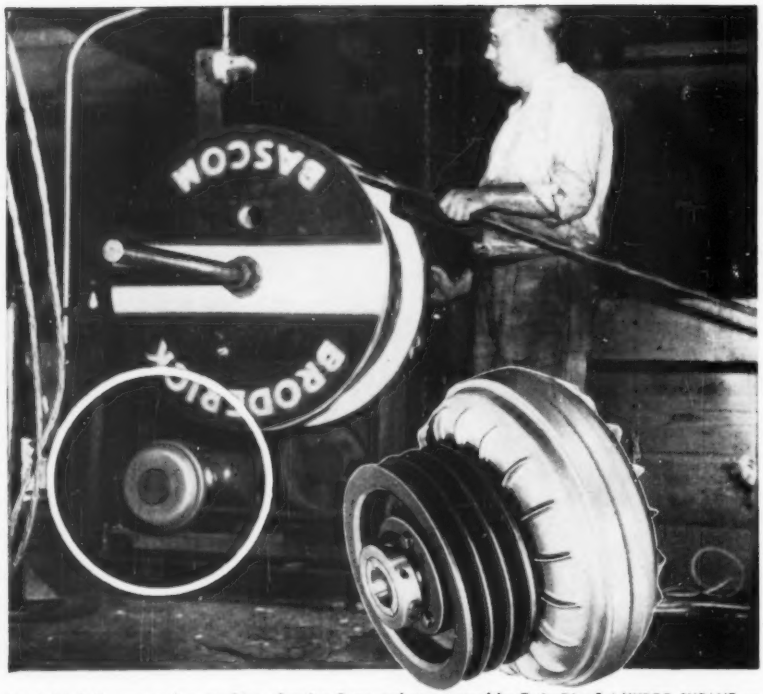


Broderick & Bascom reeling machine, showing 5-ton reel now turned by Twin Disc 8.4 HYDRO-SHEAVE on 3 hp 1200 rpm motor. Twin Disc Fluid Couplings are available in 10 different models, sizes 7.45 to 27, with the broadest variety of input, output combinations to match hook-ups on practically any motor or engine installation from ¾ to 850 hp.

How to overcome starting problems

With mechanical drive on their reeling machines, Broderick & Bascom Rope Co. had a problem. In rewinding ¾" wire rope from 5-ton reels down to smaller reels, operators had to "inch" the heavy starting loads to prevent overrunning. Inevitably, heavy current surges occurred. Chains jumped their sprockets. Gears broke. Motors overheated. The wire rope was stretched, impairing product quality.

The solution? *Elimination* of mechanical drive, with *Twin Disc Fluid Couplings*—designed for the *job*.

Twin Disc HYDRO-SHEAVE® Drives were selected and slipped quickly, easily onto the motor shafts. The problem was *solved*.

The HYDRO-SHEAVES pick up the heavy starting loads smoothly, while the motor accelerates quickly—*eliminating* need for "inching." Reels no longer over-run. Slack is gone from the start. Chain-jumping, gear-breaking, motor overheating are eliminated. The wire rope no longer stretches and product quality is *protected* . . . through smoother, steadier operation.

If you have a mechanical drive problem—with *either* motor- or engine-powered industrial equipment—*why not solve it the Twin Disc way?* Write Twin Disc, Dept. DS, Racine, Wisc., *today*, for new Fluid Coupling Bulletin 144-D.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
TWIN DISC

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin
Hydraulic Division, Rockford, Illinois

For more facts circle 570 on Reply Card

NEW PRODUCTS

(Begins on page 110)

While the consumable electrode welding process has been in use for welding stainless steel and aluminum, this new system is said to make it economically possible for welding mild steel.

Welds produced can be painted without cleaning, it is stated, because there is virtually no spraying or spatter of electrode material—nor any slag-covering on the weld. Mild steel—with or without normal mill scale—of thicknesses from 1/16 in. up can be fillet, lap or butt welded. The system can be used as a semi-automatic process, where the operator holds the gun, or as an automatic process, where the gun is clamped into position and the work piece moved. Primarily intended for horizontal and flat position welding, the new process is not yet developed for vertical or overhead welding. Westinghouse Electric Corp.

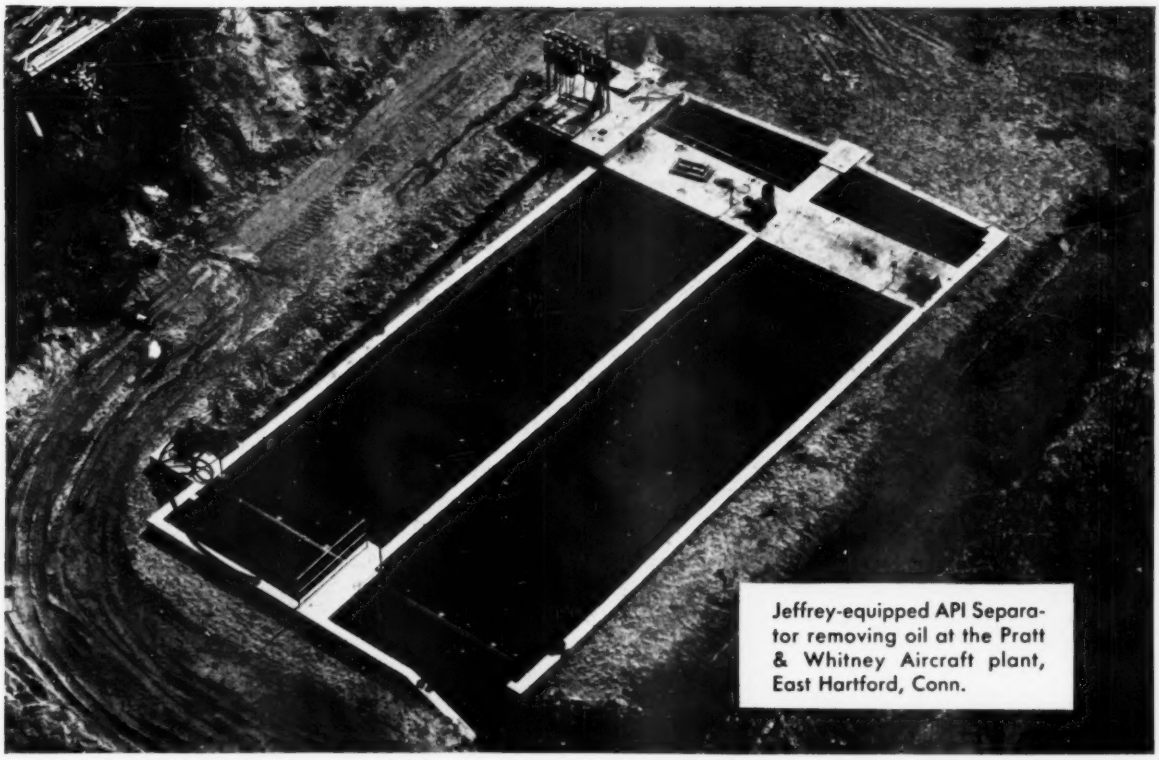
20—HYRAULIC PUMP for use in operating rams

Equipped with a ½ hp motor with capacitor start and induction run, the Y-24 Hydraulic Pump is for use in operating company's versatile Power-Twin Rams. The pump is a single piston, belt driven

reciprocating type, capable of delivering 10,000 psi in intermittent service and 6000 psi for continuous service. It will operate all four Power-Twin Rams of 17½ to 100-ton capacities faster and more efficiently than hand-operated pumps, says manufacturer. The 1725 rpm, 115 v a-c, 60 cycle motor is equipped with automatic reset and overload protection. Motors with different characteristics may be supplied. Owatonna Tool Co.

21—SHEATHED CABLE for 5000-v power feed service

Through the use of polyethylene insulating compound, and a polyvinyl-chloride sheath, this new cable has a smaller diameter and is lighter than similar cables of equivalent capacity, it is pointed out, and this makes for lower installation costs. At the same time, these compounds provide superior resistance to chemicals, moisture, and to mechanical damage and wear, says company. The cable has three conductors, each individually shielded through its entire length with a metallic shielding. Ground wires, having a total cross section of at least 90 per cent of the area of one conductor, are placed in



Jeffrey-equipped API Separator removing oil at the Pratt & Whitney Aircraft plant, East Hartford, Conn.

JEFFREY has the answer to pollution problems

Are state or federal anti-pollution laws giving you headaches? Then call on Jeffrey Sanitary Engineers for practical relief. A Jeffrey-designed installation will neutralize your industrial wastes efficiently. Here's how:

CHEMICAL DOSING: Jeffrey WAYTROLS, Bin Check Valves and Vibrating Feeders assure continuous, automatic dosage.

MIXING: Jeffrey Flash Mixers, with turbine type impellers, mix chemicals thoroughly with wastes.

FLOCCULATION: Jeffrey FLOCTROLS coagulate particles and promote rapid settling.

SETTLING: Jeffrey automatic, continuous Sludge Collectors scrape deposit to sump at end where it is pumped out and de-watered or sent to lagoons.

Hundreds of industrial wastes treatment plants throughout the nation are now Jeffrey-equipped. Scores of industries have found Jeffrey's wide engineering experience and broad line of proved equipment the best answer to pollution problems.

Write for descriptive literature.

THESE JEFFREY UNITS WILL HANDLE YOUR INDUSTRIAL WASTES:

FLOCTROLS	Transmission Machinery
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Bag Elevators	Oil Separators
Sludge Collectors	Oil Skimmers
Sludge Elevators	Chemical Feeders
Lime Pulverizers	Chains & Sprockets
Grit Collectors & Washers	De-Watering Screens & Dryers
V-Bucket Collectors	Belt & Spiral Conveyors
Specific Gravity Separators	

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General Contractors TRAYLOR BROS., INC.
All structural steel and doors INTERNATIONAL STEEL CO.

3 IN A ROW...

won by INTERNATIONAL SERVICE

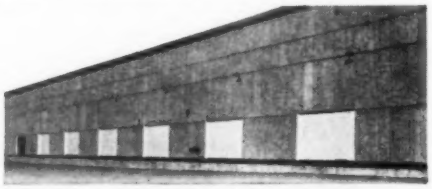
BUSINESS HAS BEEN GOOD at the huge Beeler Warehouse pictured above! So good, in fact, that the first big warehouse building — erected just a few years back — has already been increased by two mammoth additions, to meet the requirements of this fast-growing organization.

And in each case, International was awarded the contract for supplying *both* structural steel and loading dock doors.

The third and newest Beeler addition brings to 403,200 square feet the total warehouse area now framed in International Steel. Both railroad sidings and truck docks are serviced by batteries of one-piece vertical lift doors — all balanced to assure easy opening or closing, completely or partially opened as required — all 42 engineered and fabricated at International Steel Company.

It was International's complete, and *completely integrated* service . . . proved most efficient and economical on all previous jobs . . . that made it "three in a row" on this project. This same all-inclusive service is ready to go to work for you, too, on any problem or project involving the fabrication of steel. And the above coupon will bring you convincing proof that International *can* serve *you* better!

Some of the 42 International Vertical-Lift Doors — measuring from 8' x 10' up to 18' x 10' — installed at Beeler Warehouse Corp.



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INTERNATIONAL STEEL COMPANY

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NEW PRODUCTS

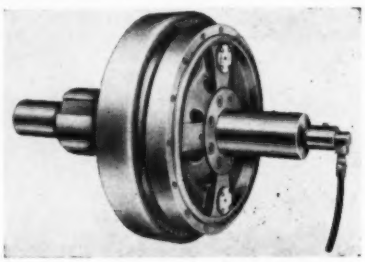
(Begins on page 110)

the interstices in contact with the shielding on the individual conductors. Fillers round out the core assembly. The core is taped and then covered with an exterior jacket of polyvinyl-chloride.

This construction is designed to offer the ultimate in protection to personnel, and against lightning. The cable is suggested for installation in boreholes, shafts, horizontal runs in underground entries, aerial suspension on insulators. The cable is available in sizes from 6 AWG to 250 MCM. The 6 AWG, with a rated capacity of 72 smp, is 1.22 in. in diameter, weighs 895 lb per 1000 ft. Rome Cable Corp.

22—AIR CLUTCH offers quick action, easy control

The Air-Grip responds instantly to a touch of the throttle because a minimum of air is used in its operation, manufacturer explains, and this sensitivity provides "finger-tip" control and an ability to "inch" the control or throw it into full engagement, as required. Instant disengagement of clutch is said to be



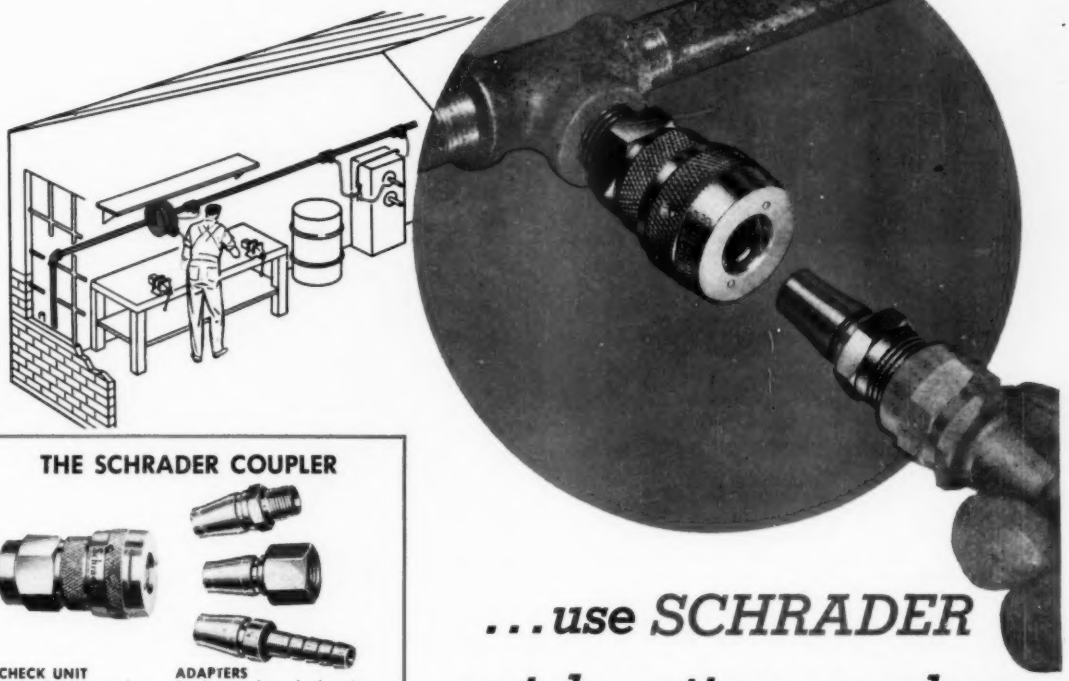
achieved by the use of quick release valves built into the clutch itself; these valves are optional equipment for extra fast disengagement.

Engineering advances announced for the Air-Grip include provision for internal ventilation and a flexibie air seal disc so located that it does not come in contact with the heat generating plates. These features are said to result in cooler operation and longer life. The Air-Grip also has provision for mechanical engagement of clutch in case air supply fails. Compact in size, this new clutch interchanges with and can be used in place of many mechanical clutches in existing installations. It is available in single and double plate models from 8.5 to 806 hp per 100 rpm at 80 psi. Dodge Mfg. Corp.

23—375-AMP TROLLEYS for mobile electrical loads

Two new heavy duty trolleys rated at 375 amp, two pole and three pole, are equal to the full carrying capacity of manufacturer's "375" track. It is explained that this eliminates the problems formerly encountered in paralleling two lighter capacity trolleys to secure a power take-off equal to the 375-amp track rating. At the same time the cost is below that of two trolleys. Designed for speeds

Make your Air Lines Pipe Lines to low cost production



THE SCHRADER COUPLER

CHECK UNIT
heavy duty or standard type — with or without swivel — with male or female inlet threads

ADAPTERS
for heavy duty check units — or standard units — with male or female threads, or serrated shank — for many pipe and hose sizes

...use SCHRADER quick-acting couplers

Spot **Schrader Couplers** everywhere in your plant—along benches... on columns... *wherever an air outlet means convenience.* Schrader Quick-Acting Couplers make air as easy to "plug in" as electric current. Yes, bring air to the job, not the job to the air line—and you'll get greater portability in your air tools . . . eliminate extra lengths of hose and miles of foot steps.

Schrader Couplers are quick . . . they're safe . . . they're sure.

To connect, just push the adapter section into the check unit. *Accidental* uncoupling is impossible—it takes a positive manual twist of the check unit sleeve to disconnect the coupler and shut off the air.

Make compressed air accessible in your plant, as the largest and most modern plants have done. Schrader Couplers are available in many pipe thread sizes and hose adapters. And remember—Schrader produces a full line of cylinders, valves and other air control equipment, to make your compressed air circuits neat . . . efficient . . . reliable. For details, write today—or fill out the coupon below.

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Light Weight—Heavy Duty
High Speed Chain Hoist
Capacities from ½ to 10 tons

Made of tough aluminum alloy. Carries with ease. 1 ton model weighs only 36 pounds. 42% fewer parts. Requires little maintenance. Sealed-in lifetime lubrication. 96% efficient. Equipped with Herc-Alloy flexible welded load chain. The best there is in hand hoists...yet reasonably priced.

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Lifts or Pulls
At Any Angle
¾, 1½, 3 and 6 ton capacities

For lifting, pulling, skidding, stretching, straightening. Use at any angle. Eliminates dangerous makeshift methods. Automatic brake. ¾ ton model weighs only 13 pounds. Herc-Alloy flexible welded load chain. Time savings quickly repay low initial cost.

● **ALSO** Meteor Wire Rope Electric Hoists (½ to 5 tons), Comet Electric Chain Hoists (⅛ to 2 tons), CM Trolleys and CM Cranes.

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NEW PRODUCTS

(Begins on page 110)

up to 300 fpm, these trolleys are designed to offer maximum safety and minimum maintenance in facilitating the movement of heavy tonnage cranes, portable welding apparatus and other electrical equipment having motor loads up to 200 hp at 440 v a-c. To put the trolley in use, you simply connect the load line to the solderless type pressure connectors within the steel terminal box. Feedrail Corp.

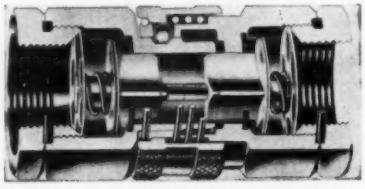
24—NUMBERING MACHINE works easily, quietly

The Force Paragon Model 1C Automatic Numbering Machine is said to offer extra efficiency and flexibility for use with

carbon snap-out forms. It features a hard-rubber impression bed and a rubber base for elimination of noise and ease of operation. It has sharp-faced 3/16 in. Gothic figures with six wheels, and will number consecutively, in duplicate, or repeat. William B. Force Mfg. Co.

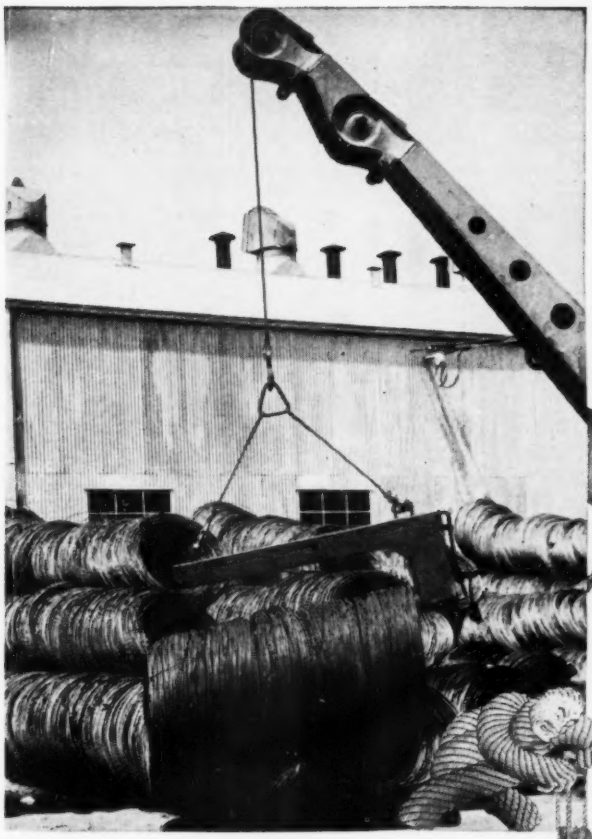
25—COUPLINGS for heavy surge, high pressure use

Incorporating several new design features, this company's H Series Coupling comes in sizes from ⅛ to 10 in. ID. A quick connect-disconnect coupling, it is announced as suitable for higher pressure and heavier surge applications than



before. The metal-to-metal valve stop in closed position permits positive control of compression of valve washer sealing member regardless of surge or pressure build-up in the line; valve washer's life is increased since it isn't overcompressed or placed in shear.

A new type of barrel spring, with perforated "spider," full circle valve stop and guide, holds steady in open position, it is noted, and permits high pressures and surges in both directions



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You Prove How Tough Tuffy Slings actually are . . . to your complete satisfaction . . . with the 3-ft. Tuffy Sling we give you! We're convinced you'll say it's stronger, more flexible, more economical than any sling you've ever used. Here's why:

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- ☐ FREE 3-Ft. Tuffy Sling!
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. . . the new protective coating designed to give complete protection against corrosion; save you many dollars in replacement costs. Easy to apply — brush or spray — **ZRC** gives lasting protection to iron and steel . . . at coverage costs low as 1½¢ per sq. ft.

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ZRC SAMPLE . . . literature, coverage cost facts and figures, prices, and test panel available, write Dept. PE.

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NEW PRODUCTS

(Begins on page 110)

through the coupling or even rapidly pulsating surges in both directions. Alloy steel of high tensile strength is standard material, coupling—however, this coupling can be made in a variety of other materials. Snap-Tite, Inc.

26—PLASTIC PIPE is lightweight and flexible

Series 200 Plastic Pipe is made of virgin polyethylene resin, manufacturer announces; it is non-toxic, won't rot, rust or corrode; and is easily handled, requiring no special tools for installation. It is also claimed to be economical and to last indefinitely. Typical applications include cold water systems, sewerage and waste, water service lines, and conveying of industrial chemicals, gases. Quaker Rubber Corp., Div., H. K. Porter Co., Inc.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

27—PRODUCTION TOOL for filing, cutting operations

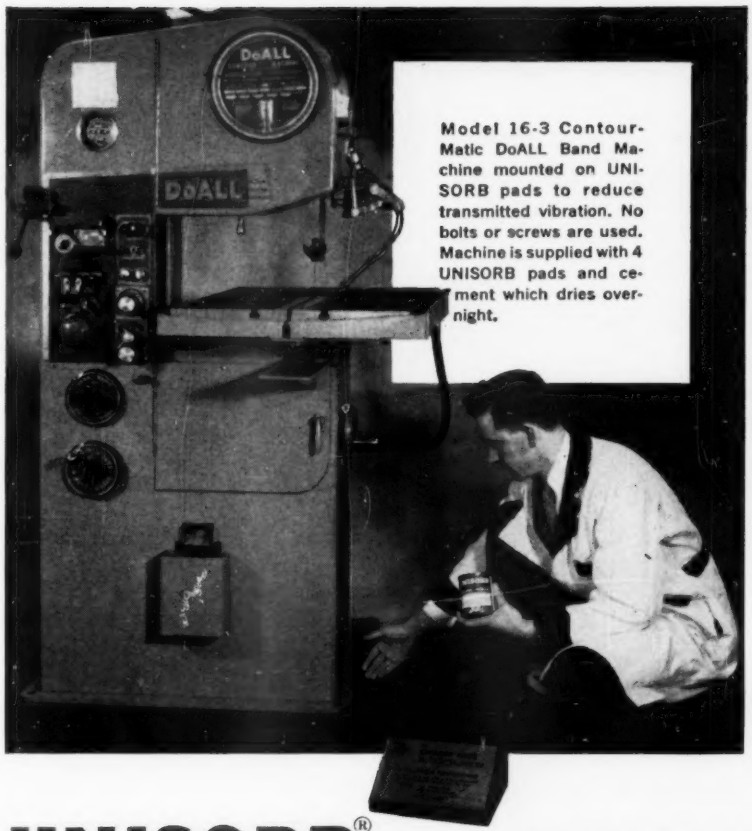
Not an attachment, the CP-3017 File and Saw is a 5-lb production line tool designed to cut every material and shape ordinarily worked by power hacksaw or by hand; it powers up to ¼-in. round

shank bench files or flat shank sizes to $\frac{1}{4}$ by $\frac{5}{32}$ in. A universal chuck holds every blade on the market, says manufacturer, and blade collet and file chuck are interchangeable.

According to company, high torque rotary motion of the stall-proof motor is converted to 1500 reciprocating ¾ in. strokes per minute. A built-in speed regulator permits selection of proper speed range for the job. Exhaust air blows cuttings from the work area. Standard equipment includes high speed metal cutting blades; all purpose blades for work in plaster board and like materials; a saw collet; work rest; file chuck and guard, and ⅛ in. Hex Allen wrench. Chicago Pneumatic Tool Co.

28—STEAM HEATERS meet wide range of uses

These steam unit heaters are announced in 16 horizontal and 12 vertical types, and in a special model without fins for



Model 16-3 Contour-Matic DoALL Band Machine mounted on UNISORB pads to reduce transmitted vibration. No bolts or screws are used. Machine is supplied with 4 UNISORB pads and cement which dries overnight.

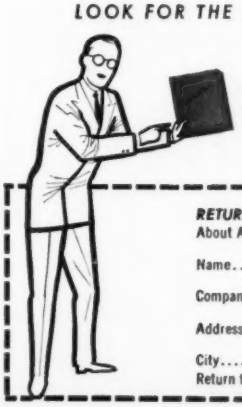
UNISORB® MOUNTING PADS are supplied with the new DoALL Contour-Matic Band Machines...

New Contour-Matics are installed on UNISORB pads, without floor drilling, without bolting the machines in place.

Practically every type of production machine can be quickly installed on UNISORB pads. Labor savings are as much as 20%. Transmitted vibration is reduced 60% to 85% and you get quieter operation.

For full information about this modern way to install your machines, return the coupon for your free copy of the booklet about UNISORB.

LOOK FOR THE RED CENTER AND UNISORB BRAND MARK



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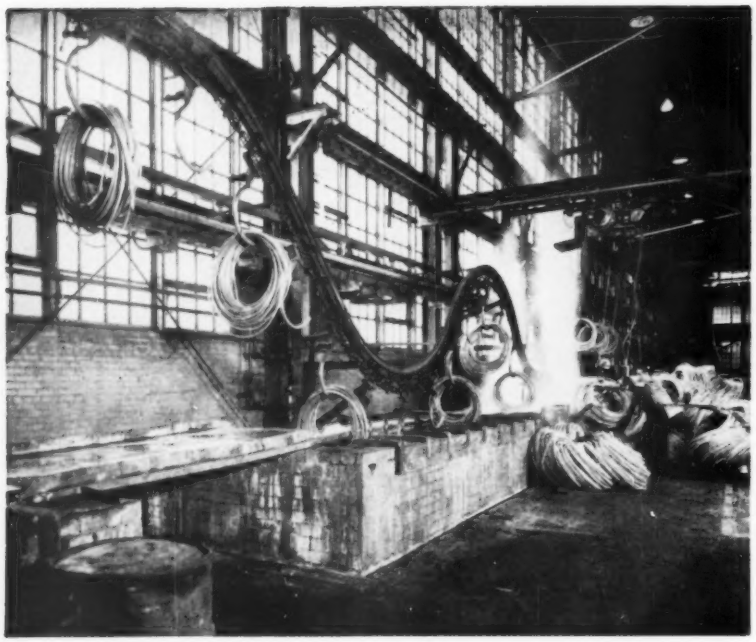

OVERHEAD TROLLEY CONVEYERS

one of the many types of high-quality power and gravity conveyers in the MATHEWS Line

Overhead Trolleys are among the most frequently applied types of power conveyers. They are used to serve processing machines, move material from one area to another, take components through painting, drying and enameling operations, and are, in fact, an extremely versatile type of equipment. Trolley Conveyers can be lowered, through the use of transverse bends, to working areas so that parts may be placed or removed from hooks or trays. They are used for storage conveyers, holding materials until needed and saving valuable floor space for production machines.

• **Write for catalog HB53 for complete details of Trolley Conveyers and for other types of Power Conveyers and Special Conveying Machinery, or for Catalog No. 853, featuring numerous installations that might help you with your conveying problems. Both catalogs are yours for the asking.**

MATHEWS CONVEYERS

GENERAL OFFICES . . . *Mathews Conveyer Company*
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Engineering Offices or Sales Agencies in Principal American and Canadian Cities

For more facts circle 578 on Reply Card

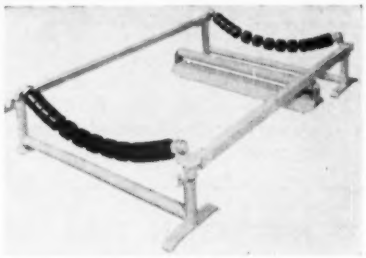
NEW PRODUCTS

(Begins on page 110)

use in textile plants. Installation is simplified, with side entrances on the horizontal models which provides four different pipe connection arrangements, each easily made and permitting maximum headroom. An improved louver arrangement assures efficient heat flow and all models have totally enclosed motors to drive the propeller fans. Ilg Electric Ventilating Co.

29—BELT CONVEYOR IDLER shapes itself to load

A cable-suspension idler for belt conveyors, the Limberoller is said to provide a load-conforming catenary, cushion the belt, and handle both bulk and packaged materials. It uses only two bearings and carries the belt on resilient Neoprene discs, all the same size and all revolving



at the same peripheral speed. Discs are molded to a Neoprene-sheathed, flexible steel cable, suspended from the two bearings. In continuous contact with the loaded belt, the discs exert a slight gripping action that holds slippage to a minimum and tends to keep the belt aligned. The discs have good resistance to abrasion, it is noted, will not support combustion, and resist many chemicals.

The Limberoller is slot-mounted in special bracketed stands, which are assembled into conveyor sections, without bolts or cover sheets, by means of bed-frame-type channel rails. It permits conveyor heights from 13¼ to 15¾ in. and is available for belt widths of 24, 30 and 36 in. Bulletin LD-103 gives details. Joy Mfg. Co.

30—CLUTCH-COUPLING UNIT is full-complement type

For applications where over-running features are required in conjunction with a flexible coupling, a new full complement clutch coupling is introduced. It is being applied most often in dual drive and alternate power applications. To compensate for the large range of operating conditions encountered, this unit incorporates, within the same space limitations, two types of construction. One is specifically designed to be used for low speed over-running applications, and the other, where practically continuous high-speed over-running conditions are encountered.

It is explained that through this full

The world was troubled when that star first came . . . then, too, dictators in far lands oppressed those who sought the contentment of family, church and their work.

But we still have the STAR. The Star of Bethlehem . . . in our city, our community. In our troubled era, may it guide us in all our relationships in the years to come. May we by prayer, thought and work come to fulfillment of Peace on Earth and Good Will to Men.

In this spirit, we wish to all a Merry Christmas and a Happy New Year. Fairbanks, Morse & Co., 600 South Michigan Avenue, Chicago 5, Illinois.

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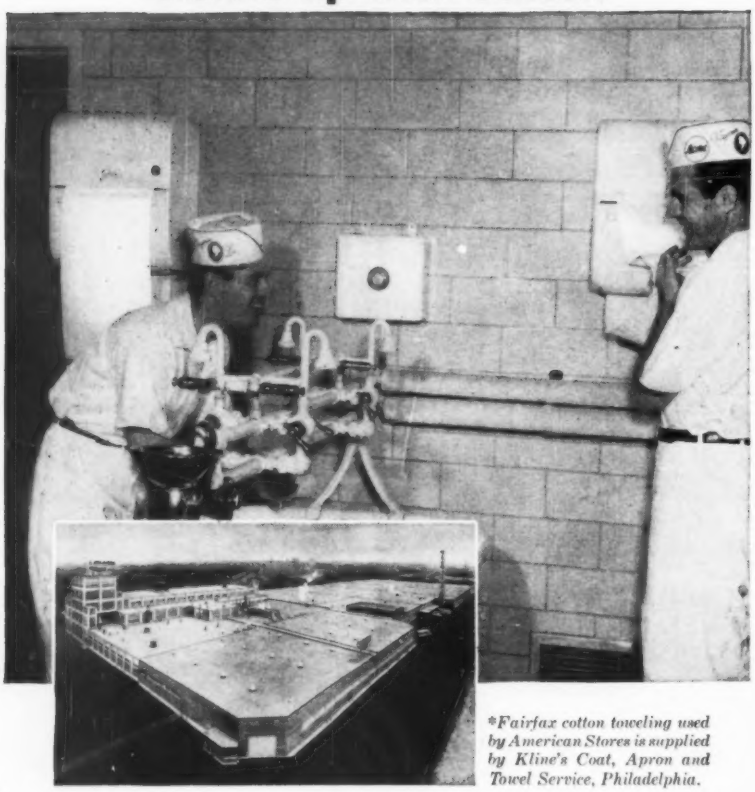
a name worth remembering when you want the best

DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • RAIL CARS • ELECTRICAL MACHINERY • PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

AMERICAN STORES COMPANY cleans up with cotton



**Fairfax cotton toweling used by American Stores is supplied by Kline's Coat, Apron and Towel Service, Philadelphia.*

• American Stores Company's superb new Philadelphia grocery warehouse and bakery is the world's largest . . . and the nation's first automatic bread and cake bakery. Naturally, cleanliness is mandatory . . . and cotton towels are used in all washrooms.

American Stores Company employees appreciate the "at home" touch of soft, absorbent cotton toweling.

Economy, too, starts with cotton. You'll have no inventory or storage headaches. Your washrooms will be cleaner and you'll cut down on plumbing repair bills, as well.

Whether you operate a factory, institution or office, why don't you clean up with cotton, too?

Here's How Linen Supply Works...

You buy nothing . . . your linen supply dealer supplies everything. The low cost includes cabinets, pickup and delivery, provides automatic supply of freshly laundered towels and uniforms. Quantities can be increased or decreased on short notice. Local service is listed in your classified book under LINEN SUPPLY or TOWEL SUPPLY.

Clean Cotton Towels...

Sure Sign of Good Management

Fairfax Towels

A PRODUCT OF WEST POINT MANUFACTURING CO.

WELLINGTON SEARS CO., SELLING AGENTS, 65 WORTH STREET, NEW YORK 13

For more facts circle 580 on Reply Card

NEW PRODUCTS

(Begins on page 110)

complement construction, energized sprags grip at an infinite number of positions, and the unit has the following performance characteristics; instantaneous operation with no backlash; maximum capacity for its size and weight; and long life because of low unit stresses at changing contact points. Formsprag Co.

31—CEMENT, packaged type, for mixing on the job

Alfane is an on-the job mixed epoxy-based cement, useful for joining foamed glass, brick, tile, carbon and other materials. It is supplied as a two-package unit to be mixed to produce a readily applied mortar type cement. The Atlas Mineral Products Co.

32—VACUUM CLEANER, heavy duty industrial unit

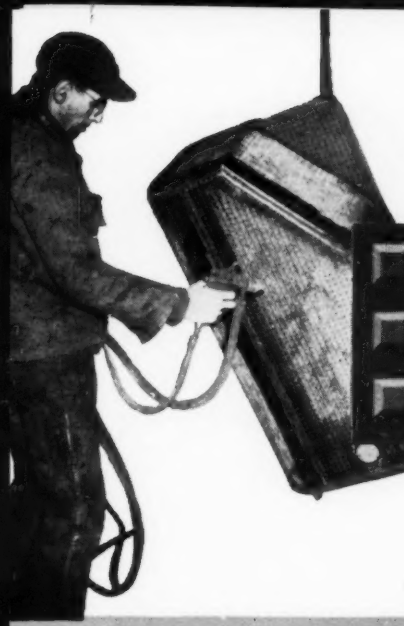
Versatility is an outstanding feature of the Series 80 Tornado Vacuum Cleaner. It has a motor unit which can be removed by a quarter turn from the top of the tank cover. This motor unit can then be converted into a portable electric

blower, a pack carried vacuum cleaner, a powerful insecticide sprayer, or an air sweeper for removal of paper and debris. A large size tank cover plate is available to fit a 55 gal drum, converting the capacity of the cleaner to 55 gal with the addition of a large size filter bag.

Other features announced for the new machine include a motor which cannot overheat or burn out when operated under maximum load constant duty conditions. A new type air impeller gives air speeds for cleaning and blowing up to 325 mph. Tanks are 15 gal capacity for wet or dry pickup, and made of stainless steel. Three models are available in ¾-, 1- and 1½-hp sizes. Breuer Electric Mfg. Co.

33—ELECTRICIAN'S KIT contains pigtails and tools

Costing less than $8.00, a new Sta-kon Kit contains an assortment of wire joint connectors and terminals and — without extra charge — an installing tool which company says is worth $3.00 alone. Ac-



SNYDER TANK CORPORATION REPORTS...

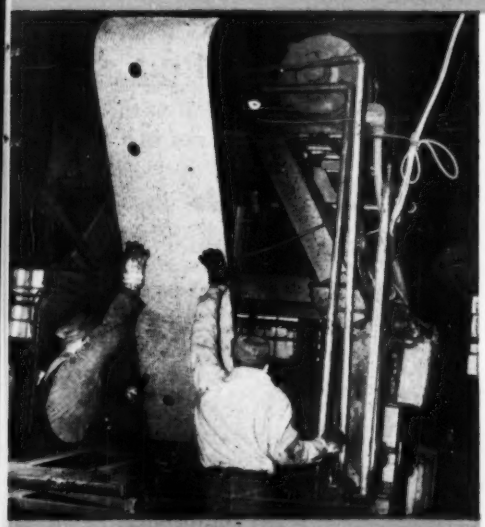
J&L Junior JAL-TREAD

Fabricates easily, economically
Provides neat, safe walking surface

Snyder Tank Corporation of Buffalo, New York, recognizes the importance of a safe footing for truck drivers when they climb into the cab or adjust the hitch. That's why, for almost ten years, the top surface of Snyder gasoline truck tanks has been made of non-slip J&L Junior Jal-tread floorplate.

Referring to the use of Junior Jal-tread on late model trucks where fuel tanks replace running boards, E. F. Olson, Sales Manager, says, "It is important to have a safe walking surface here also, because the driver must enter and leave the cab by stepping on the tank. From a customer point of view, the plate (J&L Junior Jal-tread) is neater looking too."

Regarding production costs Francis Snyder, Plant Superintendent, reports that he has less trouble fabricating J&L Junior Jal-tread than other types of steel. He adds that Jal-tread's straight line pattern of raised cleats cuts spoilage and makes fabricating, forming, punching and bending easier.



see our catalog in SWEET'S

Whatever your application in new construction, new equipment or replacement jobs, you'll find that J&L Jal-tread and Junior Jal-tread offer floorings that are long-lasting, safe, neat, easy-to-clean and easy-to-fabricate. Check the advantages of Jal-tread, the only true checkerboard floorplate, today.

Available at leading distributors everywhere

Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*

J&L STEEL

For more facts circle 581 on Reply Card

R-W "Zig-Zag®" Continuous Power Conveyors

An outstanding example of how ZIG-ZAG helps speed production is found in the plant of the television receiver manufacturing division of the Columbia Broadcasting System, Long Island City, N. Y. The system shown, one of seven ZIG-ZAG systems in use in CBS-Columbia plants, carries chassis to the various assembly areas, leaving aisles free.

Television picture tubes being moved from storage to assembly areas in CBS-Columbia plant. Note rigid V-pendant which keeps tube hanging plumb and clear of track in all planes of travel.

"What's your line?"

Whatever it is, you'll find that production is faster, cheaper, more efficient with R-W ZIG-ZAG Continuous Power Conveyors. ZIG-ZAG Conveyors are specially-designed to break materials handling bottlenecks—in transporting materials to, through, and from production lines, and in packaging and loading systems.

ZIG-ZAG carries materials *overhead* . . . up, down, in, out and around, like water through a pipe. Installation in this manner utilizes previously "dead" space and often releases much valuable floor area for other jobs.

With carrying pendants located on 6-inch centers, ZIG-ZAG is designed to handle any load a man can lift in continuous production. A choice of drive units permits travel at any required speed with variations of 10 to 1 or better. And ZIG-ZAG is easily altered, expanded or relocated by plant personnel, usually without waste of a single part!

Yes, whatever your line is, there's a place for R-W ZIG-ZAG Continuous Power Conveyors to help you boost production. *For full information contact your nearest R-W Engineering Office.*

Richards-Wilcox Mfg. Co.
MATERIALS HANDLING DIVISION
Branches in Principal Cities

1880 1954

460 W. THIRD STREET, AURORA, ILLINOIS • SLIDING DOOR HANGERS & TRACK • FIRE DOORS & FIXTURES • GARAGE DOORS & EQUIPMENT • INDUSTRIAL CONVEYORS & CRANES • SCHOOL WARDROBES & PARTITIONS

For more facts circle 582 on Reply Card

NEW PRODUCTS

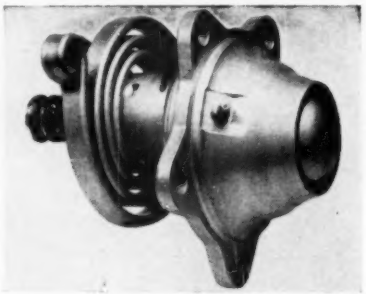
(Begins on page 110)

cording to manufacturer, this is the first time that pressure terminals and pigtails have been offered in the same package, providing fittings for a wide range of uses. The kit can be used for terminating and splicing conductor from 20 to 10 AWG. Over-all applications cover fixture splices, circuit splices and pigtail joints. Specific uses include electric motor leads and control wiring.

The kit is described as a great convenience to the electrician doing work at a distance from his stockroom source of parts. Its light weight and pocket size make it easy to carry to the job with other commonly used electrician's tools and supplies. The Thomas & Betts Co.

34—SUSPENSION SYSTEM for trucks and trailers

This suspension-type "floating hub" is described as a complete suspension system employing a stub type axle as an integral part which may be secured in tubing or a clamping bracket. The spring eye is held by a small anchor pin or stud attached to the bracket. The demountable wheel is secured to the hub with conventional wheel mounting bolts. In addition to its shock absorption and ride

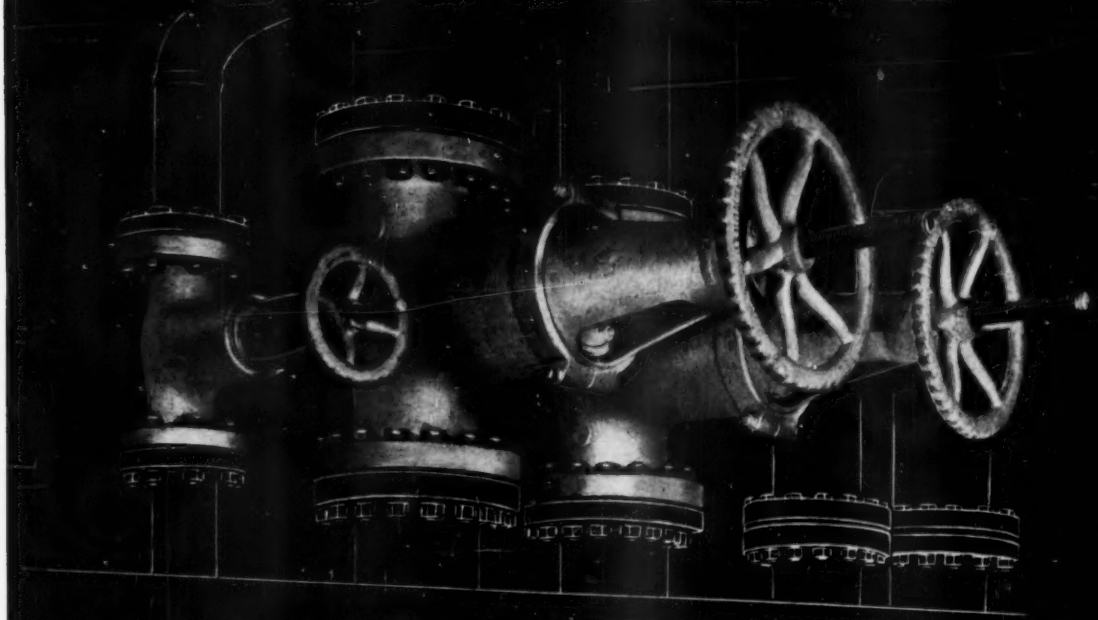


characteristics, this suspension system is declared advantageous where lowest possible center of gravity or platform height is important since it lends itself to applications where through axles cannot be used, or present complications. Details in Drawing S-1000. The Bassick Co.

35—HOSE COUPLINGS with built-in check valves

Announced as now in production are quick-seal leak-proof hose couplings with built-in single or double check valves. Already in wide use, the basic type of coupling structure is declared particularly suited for high-pressure, heavy-flow applications because its simple construction is designed to make the hose line leak-proof the moment the coupling is closed—and to seal it tighter the higher the pressure builds up inside. In the new design, this coupling has been combined with either a single or double check valve to produce a coupling which has the above features and, in addition, shuts closed either one end (single check

WALWORTH

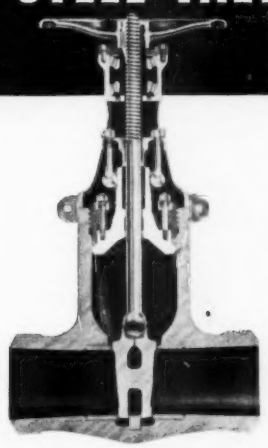


PRESSURE-SEAL CAST STEEL VALVES

Better because ... **They have no bonnet flanges, bonnet bolts, or bonnet welds. Ideal for high-pressure, high-temperature steam service and corresponding boiler feed service, Walworth Pressure-Seal Cast Steel Valves weigh less, and take up less space than the flanged bonnet type of valves used for similar services.**

These are a few of the important advantages made possible by the design of Walworth *Pressure-Seal* Cast Steel Valves. Internal line pressure is utilized within the bonnet to maintain a tight, leakproof, body-to-bonnet connection under all normal operating conditions. The higher the pressure, the tighter the seal.

Ask for your copy of Walworth Circular 143. It gives detailed information, including sizes, dimensions, and specifications for all Walworth Pressure-Seal Cast Steel Valves.



Cross section of 8-inch Series 900 Walworth Pressure-Seal Cast Steel Gate Valve. Pressure-Seal Globe, Check, Angle, and Non-Return Valves are also available in Series 600, 900, 1500 and 2500 in a wide range of sizes.

WALWORTH

Manufacturers since 1842

valves . . . pipe fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

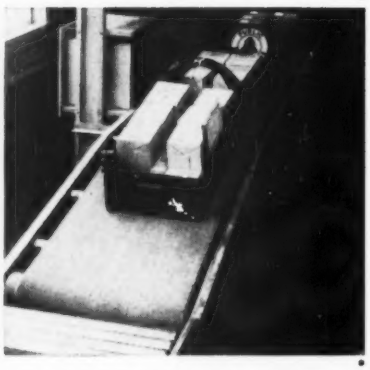
DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

For more facts circle 583 on Reply Card

ENGINEERED BELTING . . . THE RIGHT BELT FOR EACH JOB

18 Western Electric Operations Use Imperial Belts

Imperial Rexall Package Conveyor Belt moves heavy telephone terminal assemblies in Western Electric's Point Breeze Works, Baltimore, Maryland.



At Western Electric's Kansas City Distributing House an Imperial Standard Rexall Belt gives dependable service on a general duty conveyor.

From Watertown, Mass., to Emeryville, Calif., and at operations in 16 other cities from coast to coast, Western Electric Company uses Imperial Belts for many conveying jobs. The two installations shown above are typical . . . and the belts are but two of Imperial's many brands for every type of service.

Job-designed belting

Since no one belt is suitable for all kinds of service, Imperial has specialized in the development and manufacture of individual brands to meet specific operating conditions. That's why so many companies like Western Electric call on Imperial for their belting needs.

Inner-locked construction—Special impregnation

All brands of Imperial Belting are made of heavy-duty hard silver duck with a tensile strength of over 750 pounds per inch of width. Plies are double - stitched. Inner-locking stitches positively prevent ply separation. This tough-wearing fabric is then treated with Imperial's exclusive impregnating compounds . . . chemicals which waterproof, lubricate, toughen or otherwise condition the belt to suit the service requirements for which it is made.

Lowest year-after-year cost

Whether you have a simple conveying job or a high-temperature, abrasive application there's a job designed Imperial Belt to fill your requirements and cut your materials handling costs. Write for informative new Catalog 54-3.

Imperial INNER-LOCKED BELTING
First in stitched canvas belting for over 45 years

You expect more from Imperial and you get more!

IMPERIAL BELTING COMPANY

1759 S. Kilbourn Avenue
Chicago 23, Illinois

Write for new Catalog 54-3. It will help you cut belting costs.

For more facts circle 584 on Reply Card

NEW PRODUCTS

(Begins on page 110)

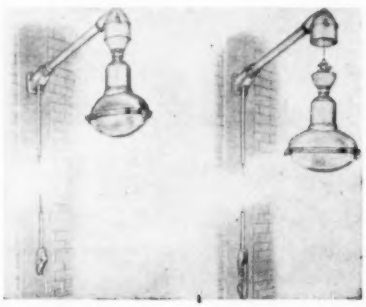
valve) or both ends (double check valve) of fluid line the instant coupling closes.

According to manufacturer, this valve arrangement eliminates the need to shut down pumps or close valves in order to break the connection; it avoids loss of valuable or hazardous fluids when the line is opened; and it eliminates the need to drain lines prior to uncoupling. The coupling is made in several types for different methods of hose attachment: female pipe thread, male pipe thread, expansion ring, or barb shank type. Sizes to 12 in. are available. Standard materials are cadmium plated steel with Neoprene and Buna N Seals. Titeflex, Inc.

36—WALL BRACKETS designed for greater safety

Servisafe wall and wood pole brackets are reported to permit safe, efficient ground-level luminaire servicing. Incorporating company's disconnecting and lowering hanger mechanism, the units are designed to eliminate climbing and electrical hazards. In addition, the unit design provides a wide range of application and permits greater mounting heights for improved area illumination.

To lower luminaire mounted on bracket:



open lockbox near wall or pole base and attach a handline to operating cable. Then disconnect the two hanger members with a slow pull and quick release on handline and lower lighting fixture to ground level. Because the live contacts remain in upper member, the lowered part presents no electrical hazards, it is pointed out. After fixture is serviced, it is returned to operating position and re-seated by means of handline. Supplied in complete packages for wiring and erecting, the units can be used with standard pendent and flood type luminaires. Mast arms range from 2 to 12 ft, in 2-ft increments. Thompson Electric Co.

37—BLOWOFF SYSTEM affords heat, fuel economy

This continuous blowoff system not only maintains uniform dissolved solids concentration in the boilers, manufacturer says, but in most cases provides heat savings sufficient to amortize the initial investment. It is pointed out that practically all heat contained in the blowoff is

HALL INDUSTRIAL WATER REPORT

Hall Laboratories, Inc.—A Subsidiary of Hagan Corporation, Pittsburgh, Pa.

Volume 2 | DECEMBER 1954 | Number 6

Close Control Pays Off in Clean Boilers

When Hall Service was started at an East Coast plant, R. A. Beardsley, service engineer, undertook to educate and interest all of the operating personnel in their water conditioning program, so that follow-through on his recommendations for better operation would not be left to "George." In this plant no actual failures had occurred, and because chemical treatment had been used, the personnel was convinced that such troubles as plugging of feed lines, poor distribution of chemicals, and the time and labor consuming cleaning job were necessary evils. The plant men were astonished when minor modifications in pre-boiler control and treatment practices, faithfully carried out, resulted in major improvements in the internal condition of four waste heat boilers.

Tight control now polices chemical treatment and adjustment of the phosphate-silica ratio in the boiler water has eliminated the adherent magnesium phosphate scale that was responsible for the massing of deposits.

Since the plant men had formerly taken it for granted that crowbars, chisels and hard labor were needed to get rid of heavy scale accumulations, washing out the greatly reduced amount of deposit right down to clean metal now seems like child's play.

Foreign Relations

One Hall staff engineer had to travel 8000 miles to go to work recently when a request for consultation came from the Arabian American Oil Company in Saudi Arabia. But setting up water treatment for boiler operation, for the protection of condensate lines and for air conditioning equipment at three plants made A. M. Henricks feel that he had never left home during the five weeks he spent in Arabia. Mr. Henricks' long-distance service job was one of several such trips he has made in the last few years.

Another phase of Hall Laboratories' foreign service is a training course which has been given to engineers and technicians from all parts of the world. Although this training is made available to Hall Laboratories' domestic clients, it is especially valuable to personnel from foreign plants in familiarizing them with the latest in water treatment.

Engineering and Industrial Wastes

In a Panel Discussion on Stream Pollution presented at the Fifteenth Annual Water Conference, H. A. Reda of Hall Laboratories defined "An Engineering Approach to Industrial Waste Problems." Viewing plant process and waste water problems as a part of an integrated program of water use leads to the systematic analysis that constitutes the engineering approach. Mr. Reda pointed out that "bonus" benefits frequently result when the investigator studies the entire water system in a plant in order to set up the most effective and economical treatment of industrial wastes. Recovery of costly process materials, reduction of water consumption, and re-use can help to offset the cost of treatment. In one plant, study of over-all water practices enabled Mr. Reda to reduce the preliminary $250,000 estimate by almost one half.

Mr. Reda's discussion brought out the value of the engineering approach in unraveling the complex waste disposal problems in plants built long before the pollution of streams was a consideration in industrial operations. In many of these older plants, no one actually knows how the piping is laid out. In some, where the water source is located on plant property, no measurement of flow rates has ever been made; probably such a plant would not even have a flow meter. In these plants, only an engineering approach can solve the problems effectively.

Hall Engineer Boosts Employee Morale

The several hundred employees of a glass manufacturing plant complained that hot water in the bath house was extremely hard and much too scarce. The shortage was due to a hard calcium carbonate scale which reduced shell-tube heater efficiency in a matter of days after each cleaning, and defied complete removal by either chemical or mechanical means.

When this unhappy situation was mentioned to Hall engineer W. J. Reese, he thought of the softened, Threshold-treated water used for make-up in the production cooling system in the plant. He pointed out that the blowdown from this cooling system, which had formerly run to waste, could be fed to the bath house heaters, thus eliminating the scale problem. Now everyone is happy . . . employees because they are getting adequate supplies of softened hot water, and management because a troublesome problem was licked without the purchase of costly water softening equipment.

Close Contact Maintained by Hall Executives

Field service engineers of Hall Laboratories get to boss the bosses when the top executives make their regular visits to all of the district offices to maintain first-hand contact with field problems. On such trips, even travel time is utilized for the exchange of information between the headquarters men and field engineers. When J. N. Welsh, Associate Director of Hall Laboratories, made the rounds of the western offices recently, one of his stops was at Nanaimo, where he presented a discussion on Steam Conditioning at a meeting of the Nanaimo Branch of the Institute of Power Engineers.

Water is your industry's most important raw material. Use it wisely.

It's easier···
with Heinemann Service Equipment
···designed for the job

SAFELET has receptacle for power tools or appliances. Built-in circuit breaker interrupts short circuits and dangerous overloads, prevents damage to equipment that's plugged-in. For use in the home workshop, on the test bench or production line. Write for Bulletin 1010

RECEPTACLE TYPE OUTDOOR SERVICE UNIT is a portable, protected power outlet for temporary plug-in service. Easily moved from job to job. Write for Bulletin 2016.

INDOOR SERVICE CENTER replaces old-fashioned fuse boxes, combines either two, four or eight circuit breakers in a handsomely styled unit for mounting anywhere in the home or commercial property. In office building installation shown, each office has its own Service Center so that power interruptions are isolated. Heinemann circuit breakers assure immediate, simple restoration of service. Write for Bulletin 1002.

HEINEMANN ELECTRIC COMPANY
128 Plum Street
Trenton 2, New Jersey

HEINEMANN Circuit Breakers

For more facts circle 586 on Reply Card

NEW PRODUCTS

(Begins on page 110)

returned to the feed water system and, at the same time, uniform boiler concentrations facilitate smooth steaming, reduce overload tendencies on the feed water equipment resulting from intermittent blowdown methods, reduce wear on main boiler blowdown valves and provide for more efficient operation of the boiler plant. Utilizing the flash principle, steam from the concentrated boiler is used in the feed water heating system, while unflashed boiler water passes through a heat exchanger located in the makeup water line. Details are given in Publication 5700. Cochrane Corp.

38—FLOOR MACHINES, all purpose units, three sizes

Motor weighted floor machines in the Model 800 Series are quiet, well balanced all-purpose units. They are readily adapted to floor scrubbing, carpet shampooing, floor waxing or polishing, disc-sanding and other operations. The machines feature planetary drive, steel brush cover, "feather touch" safety handle switch, and handle adjustable to height. They are available in three sizes with brush spreads of 15, 18 and 21 in. Operation of these machines is easy, manufacturer points out—the excellent balance comes from careful weight distribution on the brush. The motor utilized is a capacitor type of drip-proof construction. Finnell System, Inc.

39—CONTROL INSTRUMENT for the process industries

The small, compact Model 292 Series Wheelco Capacitrol is designed for accurate indicating and instantaneous control. Described as rugged and easy to service, the instrument uses plug-in components — both temperature measuring system and control chassis are of plug-in design. This feature permits quick removal of measuring system or control chassis for replacement and servicing without disturbing the instrument or external wiring.

On-the-job adjustments are provided for in the Model 292 series. The balancing adjustment for tuning the alignment index and indicating pointer to

YOU'LL SEE 'EM IN OPERATION AT CHERRY HILL

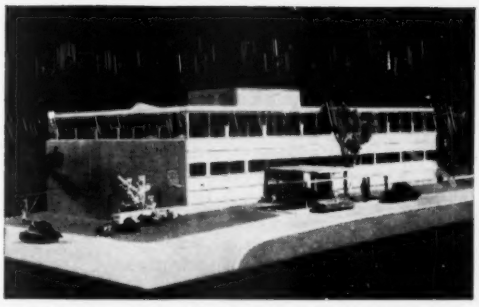
Dunham Steam Heating Specialties you see here can also be seen *in operation* throughout the new Cherry Hill project of Radio Corporation of America near Camden, N. J.

Why were Dunham Heating Specialties specified?

1. Partly because the completeness of our line makes certain that you can *get* every specialty you need from one source . . . and at the same time put all responsibility for performance on one manufacturer.
2. More important, however, is that RCA knows from years of experience that Dunham Steam Heating Specialties keep a system tight with less maintenance—guard against leaky traps and valves that misuse fuel dollars.

Dependable Dunham Specialties are an industry byword today . . . just as they have been ever since Dunham perfected the first successful commercial thermostatic radiator trap in 1903.

For full information about the full line of Dunham Steam Heating Specialties, clip and mail the coupon.



New RCA Cherry Hill Project. Scale model of Administration Building now under construction.

C. A. DUNHAM COMPANY
Dept. PE-12, 400 W. Madison Street
Chicago 6, Illinois

Send Heating Specialties Literature.

Name_____

Firm_____

Address_____

City_____ Zone____ State_____

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RADIATION • CONTROLS • UNIT HEATERS • PUMPS • SPECIALTIES

QUALITY FIRST FOR FIFTY-ONE YEARS

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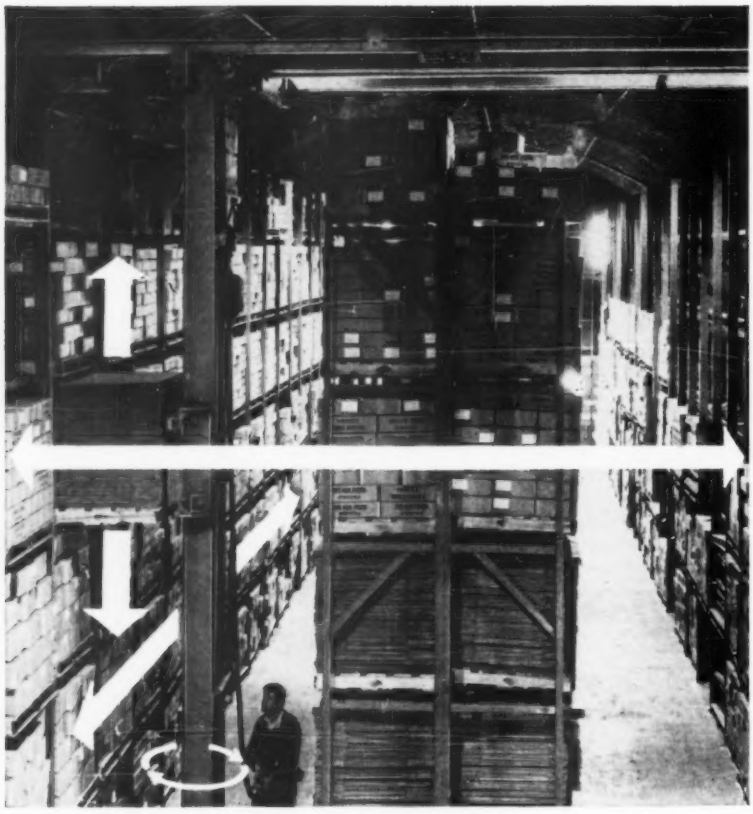


Chicago Tramrail

TRAK-RAK Storage System

... triples storage capacity at Oneida Ltd.

... cuts a 2½ hour handling time to 30 minutes

... saves building an additional $60,000 warehouse

A 3000 lb. capacity self-contained TRAK-RAK Crane installed in a quonset-type warehouse 60′ x 230′ x 30′ high at Oneida makes these savings.

NOW 900 pallet loads can be stored in the same building where previously only 300 pallets could be stored—one quarter of which were not in selective arrangement.

NOW 16 pallets 40″ x 48″ are handled from shelf to truck in less than 30 minutes instead of the 2½ hour handling time formerly required IN AN AISLE 7′ 4″, 23 FT. HIGH.

NOW three times as much storage space is obtained in the same building.

This TRAK-RAK Crane installation operates as a top-running crane on rails mounted directly on top of the racks. The crane permits movement in eight directions—up, down, to both sides; rotates a full 360° clockwise and counter clockwise to serve both aisles and can be installed in practically any type of storage building.

Each installation is individually engineered to meet building requirements and storage needs, and many variations and additional special features are available.

WRITE TODAY for TRAK-RAK Applications; *a new 20-page book illustrating and describing representative installations for many different types of material in a wide variety of industries.*

CHICAGO TRAMRAIL CORPORATION

4000 WEST WASHINGTON BOULEVARD • CHICAGO 24, ILLINOIS

For more facts circle 588 on Reply Card

NEW PRODUCTS

(Begins on page 110)

exact coincidence, plus adjustment of anticipatory action cycle time (on Model 292C), along with control setting, are all front accessible. Thermocouple break protection, that shuts off the fuel supply in case of thermocouple or lead wire failure, can be supplied. Bulletin F 5358-1 describes the Model 292 Series Capacitrol. Wheelco Instruments Div., Barber-Colman Co.

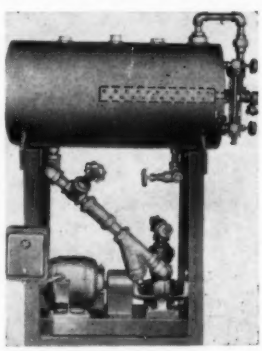
40—LUBRICATORS for tools, air operated equipment

Outstanding feature announced for this new line of Micro-Fog Lubricators is an easily adjusted variable vane venturi which lets one unit meet requirements of a much wider range of operating conditions and handle applications which previously required several sizes of lubricators. For example, says manufacturer, at 80 psi the ⅜-in. size can be set for a low flow range of 5 to 9 cfm, a high range of 50 to 100 cfm, or any intermediate range. The line includes 20 models in pipe sizes from ¼ to 1 in., with capacities of ½ pt. 1¾ gal and 4½ gal., flow from 5 to 250 cfm at 80 psi.

The new units incorporate a transparent dome for visibility of oil feed; visibility of oil supply; auxiliary air circuit for controlling oil feed from 1 drop in 20 min to 15 drops per minute. A constant oil level features is available to eliminate possibility of rate of oil feed being affected by quantity of oil in bowl. Details given in Folder 496. C. A. Norgren Co.

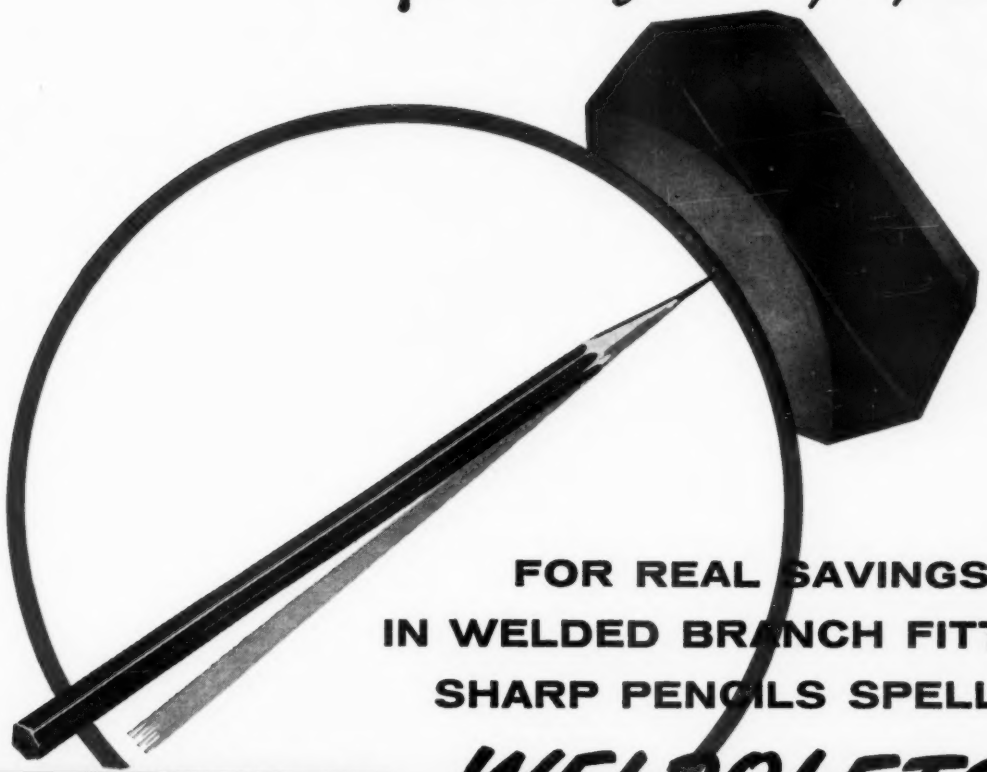
41—BOILER FEED SYSTEM incorporates a pre-heater

A boiler feed system, incorporating a pre-heater that operates on steam from the boiler is announced for use with steam boilers. The units are designed to automatically maintain boiler feed water between 190 and 200 F. Tank sizes range from 30 to 540 gal, and they supply 280 to 2800 gal of heated water every hour.



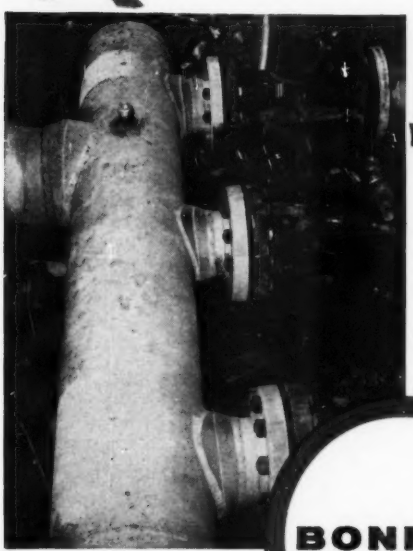
A perforated tube inserted horizontally in feed water tank is connected to the steam supply. The unit is thermostatically controlled so that steam is allowed to enter only when the temperature falls below a predetermined point. A thermostatic bulb filled with a pres-

YES - 1954 is the year of sharp pencils



FOR REAL SAVINGS IN WELDED BRANCH FITTINGS SHARP PENCILS SPELL...

WELDOLETS



$700 was saved because Weldolets were used on the welded header shown at left. (Actual on-the-job photo.)
Weldolets are available in all principal cities from selective warehousing distributors.

WELDING FITTINGS DIVISION

BONNEY FORGE & TOOL WORKS

727 MEADOW ST., ALLENTOWN, PENNA.

For more facts circle 589 on Reply Card

NEW PRODUCTS

(Begins on page 110)

sure-sensitive fluid controls a flexible bellows that mechanically opens and closes the valves, varying the opening or completely closing it. Cyclotherm Div., United States Radiator Corp.

42—MEASURING VALVES control output of lubricant

Announced as having any discharge output range desired, these hydraulically-operated valves incorporate an adjusting screw at each end of the measuring chamber for controlling the exact quantity of lubricant output, and mounting brackets to facilitate installation. The valves are designed for use with a four-way control valve, which is supplied with lubricant from a power-operated pump. The system provides means for automatically applying metered quantities of oil or grease to gear cases, small transmissions, bearings, as well as electric motors in assembly line operations. Lincoln Engineering Co.

43—FORK TRUCK is a 3-ton center control unit

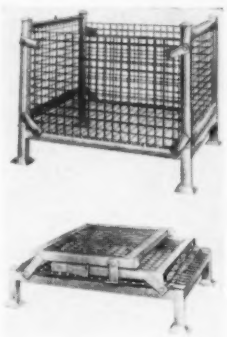
From a performance standpoint, the 6000-lb Model 630 Yank has a higher maximum fork elevation, increased travel and hoist speeds, shorter turning radius, and it will right-angle stack in narrower aisles.

Construction-wise, it has a simplified hoisting mechanism, and all new drive assembly, new trail axle, improved travel controls and improved all-welded frame, says manufacturer. Also, greater operator comfort is provided by sit-down operation and convenience of controls.

Alemite Accumeter centralized lubrication is an optional feature of this new model truck. Designed to eliminate hit-or-miss lubrication, this feature protects the trail axle, it is explained, and takes the time and trouble out of steering assembly lubrication by feeding a measured amount of lubricant to eight hard-to-reach bearings. Mercury Mfg. Co.

44—SHIPPING BOX is heavy duty, knock down type

Greater economy in materials handling, with heavier loads, is possible with the new all-steel folding Pyramid Box, a heavy-duty knock-down shipping container. It combines the structural strength of the steel tubular rack with desirable

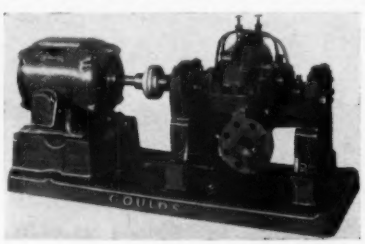


features of the wire mesh container, manufacturer states, and its rugged capacity permits handling of larger loads with fork trucks. The nesting design of Pyramids permits tiering when loaded; when empty the container folds down to a compact unit which also nests.

Each folded unit stands 15¾ in. high. The container is offered in two standard sizes 40 by 48 by 24 in. and 32 by 40 by 24 in. Each unit has a capacity of 2 tons. Units can be tiered when open or knocked down. In either case, a clearance of 2 in. between containers permits handling with fork trucks. The Paltier Corp.

45—TWO-STAGE PUMPS for handling clear liquids

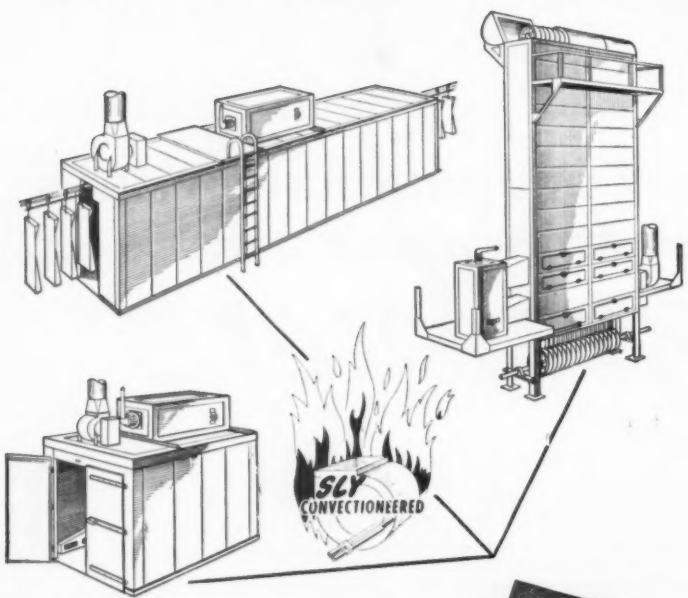
Pumps in the new Fig. 3305 line come in five sizes providing heads to 1000 ft and capacities to 1000 gpm. Designed for operating efficiency and ease of maintenance these pumps have horizontally split



casing and are so constructed that the interior can be inspected and rotating parts removed and replaced without disturbing piping connections. Opposed impellers assure hydraulic balance, says manufacturer, and thrust balance is

SLY SERVING INDUSTRY SINCE 1874

INDUSTRIAL OVENS



The solutions to your Industrial Oven and process heating problems can be found in this bulletin.
Your inquiries are solicited whether your requirements are for simple ovens or large complicated continuous systems.
For your copy of Bulletin 200 write or call.

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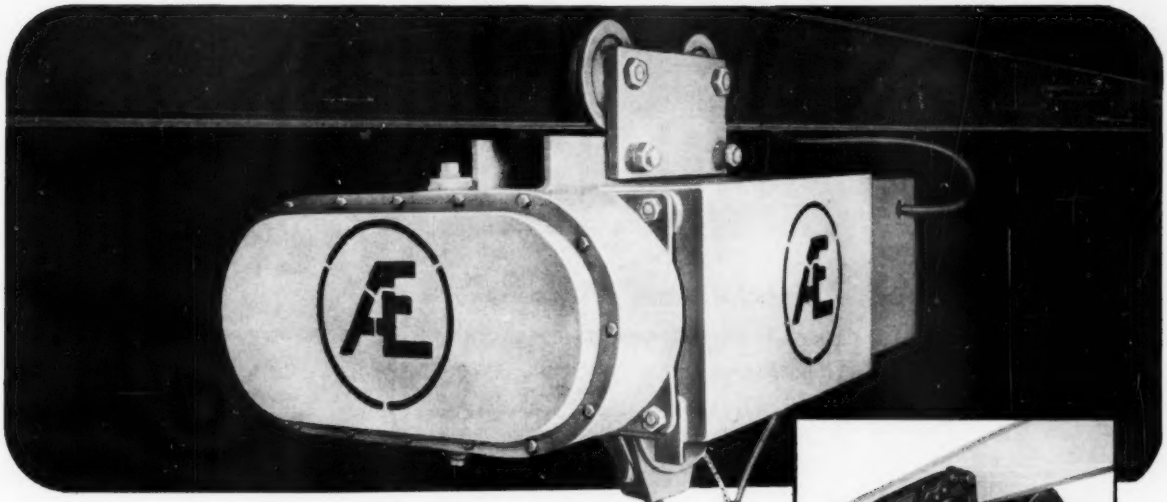
5 REASONS WHY PLANT MEN SAY,

"GIVE ME THE NEW STANDARD LO-HED"



WHEN THE NEW HEAVY DUTY "STANDARD" BB joined the Lo-Hed line last June it was acclaimed as "just what the doctor ordered." There's no mystery about this..."Standard" Lo-Hed was painstakingly tailored to meet all usual 2- and 3-ton hoist requirements.

1. It brings you Lo-Hed's famous balanced design which is unmatched for monorail or stationary service and for adjustment and lubrication ease.

2. It combines the very latest in materials and engineering ... the welded steel chassis assures maximum rigidity.

3. Its straight line spur gear drive eliminates pesky worm-wheels, extended shafts and split gear combinations.

4. Its price gives you absolutely top value for your money ... extra features such as lower limit safety switch are included at no extra cost.

5. The "Standard" Lo-Hed is truly a *standard* hoist ... quantity-produced ... ready for immediate delivery wherever and whenever you want it!

Mail coupon for full information about the "Standard" Lo-Hed Hoist—or about the Customized Lo-Hed if it will better meet your requirements.

FAMOUS CUSTOMIZED LO-HED HOIST

If your lift is more than 20 feet ... if low headroom is a factor... if you need a hoist with ¼-ton, 12-ton, or any capacity in between ... the Customized Lo-Hed is the hoist for you. It's built for extra working life ... operates with top speed and ease ... has cut handling costs in plants the country over.

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Radiant R-type Industrial Lamps give more dependable, economical service indoors and outdoors. Special weatherproof glass resists cracking due to sudden temperature changes, rain, snow, and vibration. No expensive enclosed fixtures needed. Silver reflecting surface is sealed inside. Stays bright without maintenance.

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You'll find two postage-free Reader Service Cards on pages 145-146. Use them to ask for product information — just circle the item numbers of the products. You may also use the cards for requesting advertised catalogs.

NEW PRODUCTS

(Begins on page 110)

achieved by the use of a new labyrinth diaphragm. Bearing spans have been kept short, resulting in space saving.

Wide interchangeability of parts is provided in this line of pumps and many of the parts are also interchangeable with those of company's Fig. 3405 line of single-stage pumps. Direction of rotation of the new pumps can be changed in the field by means of a locking shaft sleeve. The pumps can be supplied with conventional stuffing boxes or with mechanical seals. Goulds Pumps Inc.

46—AIR COMPRESSORS, high pressure, portable units

Four new high pressure, lightweight air compressors are announced for pressurizing hydraulic accumulators to any pressure up to 3000 psi. They are available with electric motor or gasoline engine power source. Claimed well suited to high pressure pneumatics for industrial applications, these compressors recompress nitrogen or provide clean air for pressurizing actuators, receivers and accumulators. It is noted that the necessity for use of nitrogen, even in highest pressure applications, can be eliminated by passing inlet air to the compressor through a solution of alkaline pyrogallol or Oxsorbent to remove oxygen. This is said to eliminate any explosion hazard.

Although miniature in size, the compressors are declared capable of king size work where compressed air is needed. One series includes two models which provide 0.6 cfm of free air and have a rated discharge pressure of 2500 psi. These units weigh less than 50 lb complete with power source. Another series, recommended for users of larger volumes, includes two models which deliver 2 cfm of free air at rated discharge pressures of 3000 psi. The Cornelius Co.

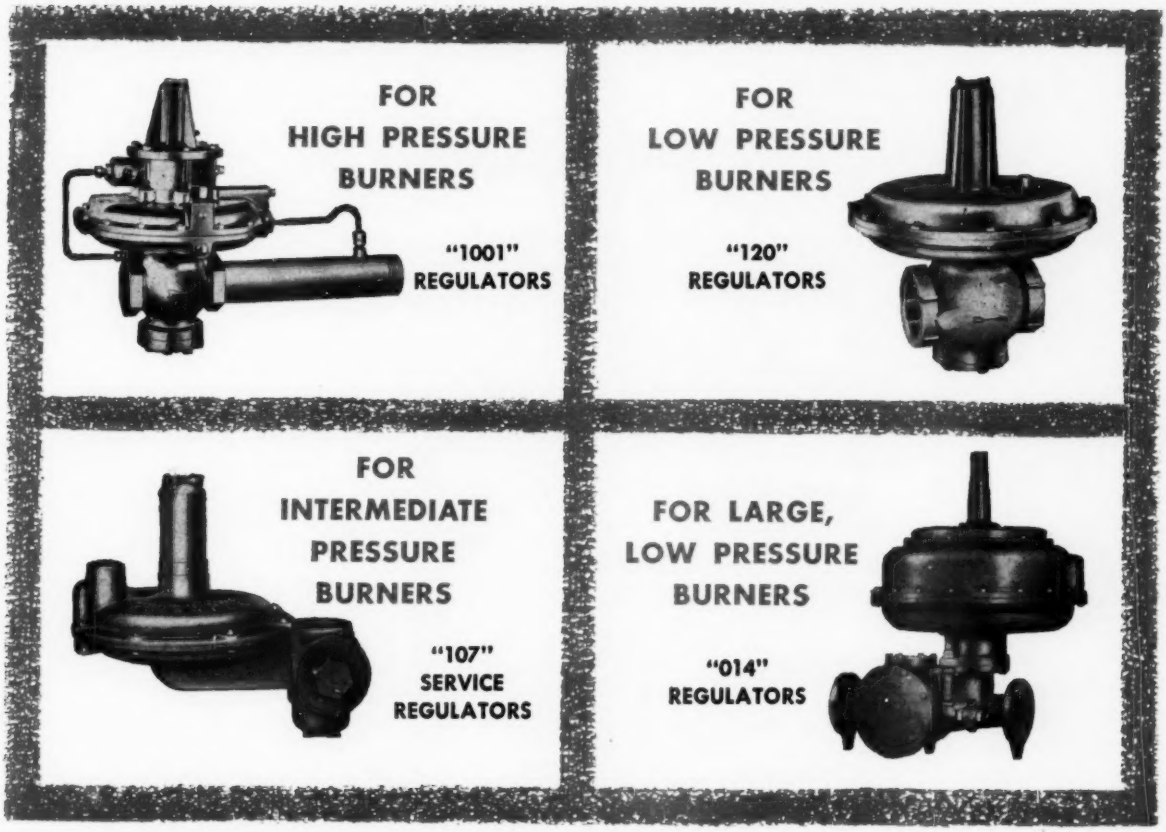
47—PLASTER CUTTER is portable electric tool

Developed to save time, labor and materials, this tool is 16½ in. long and weighs only 13 lb. It consists of a case which houses a motor which operates on a-c or d-c current; two abrasive wheels with guard, equipped with support handle; and a handle designed for easy grip to which is attached a trigger switch and 15 ft of Neoprene cord with plug-in.

According to company, the cutter does a neat, clean job and prevents cracking of the plaster. It makes two parallel cuts in the plaster by running the unit along the surface, after which the plaster between the cuts is taken out with a chisel. Although intended for use in the installation of metal conduit in plastered walls and ceilings, the cutter may be used for making single cuts for repairing cracks, and for scoring tile and other hard materials. Depth of cut is regulated by adjustment of wheel guard. The wheels may be set to cut groove of widths to 1¼ in. Wodack Electric Tool Corp.

TO GET GOOD GAS COMBUSTION YOU NEED GOOD PRESSURE REGULATION!

There's A *Rockwell Regulator* For Every Need



No matter what you may be processing with gas, the quality of your end product depends on your ability to maintain a constant, even pressure at the burners. With the *right* regulators guarding the inlet lines to furnaces, kilns, appliances, etc., it's no problem to maintain good combustion control—and to profit from it! Rockwell makes *all* types of gas pressure regulators. Among them is the *right* type for any industrial burner application. We invite you to call upon our field engineering service when combustion control problems arise. There's no obligation—just contact the nearest Rockwell district office, or use the handy coupon.

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Dual-Purpose Drilling Jig

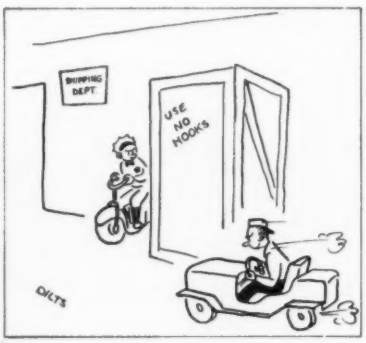
(Continued from page 84)

by revolving the bushing plate until the correct bushing diameter is over the longitudinal center line of the jig. After inserting the drill in the drill press chuck, the first hole can be drilled. The next hole position is obtained by retracting the chuck indexing pin, using the ball-ended lever, and rotating the chuck to the appropriate position for the next hole. Release of the indexing pin knob allows the wedge-shaped plunger to engage the correct notch.

For the drilling of diametric holes in round shafts, a v-block location is provided at one end of the jig base plate. The v-block is placed so that its center line intersects that of the drill bushing pitch circle. Any shaft diameter up to 2 in. will be located automatically in place in the v-block and can be drilled accurately by rotating the bushing index plate into position to locate the correct drill bushing over the shaft center.

Light clamping only is needed for drilling diametric holes in shafts and this is provided by the clamp shown in the drawing. The clamp is lever-operated and is pulled downward to hold the shaft in the v-block. To accommodate the clamp and its lever, the v-block is divided transversely into two parts so that the clamp fills the gap between them.

One of two extra refinements deleted from the drawing in the interests of



clear presentation is a circular ring which covers the chuck indexing plate and prevents the entry of chips and swarf into the indexing notches. The other is an adjustable end location stop for mass-production drilling of shafts. The stop simply comprises a vertical pillar of rectangular section welded to the jig base plate and carrying a horizontal swivelling arm on the end of a cylindrical rod.

Accuracy of the work obtained from this jig is dependent on the precision used in placing the indexing holes and notches.

The jig, once constructed, is actually a piece of standard shop equipment in the same category as a vise or other shop tool applicable to a wide range of work.

Compressed Air Via Steam Lines

(Continued from page 81)

and connected it to the compressor. Then we disconnected the old steam radiators and unit heaters and capped the open ends.

The next step was to put the air to work. There was a strong possibility there might be scale and dirt in the old steam pipes and we were somewhat concerned over the possibility of damage to pneumatic valves and tools. Good practice, however, dictates that filters, driers, and oilers be used ahead of all equipment.

We have added more air tools, grinders, vises, paint mixers, and cylinders to more machines. At present, we are using about 40 per cent of our large compressor capacity with a good possibility we will soon need an additional unit for routine requirements.

LOGAN AIR AND HYDRAULIC POWER

SPEEDS • COORDINATES • REFINES PRODUCTION
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Logan
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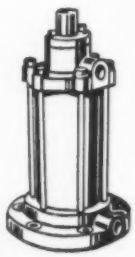

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7 standard sizes from 3" to 14" bore.

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7 standard mountings, sizes 2" to 8" bore, strokes up to 8' as standard.

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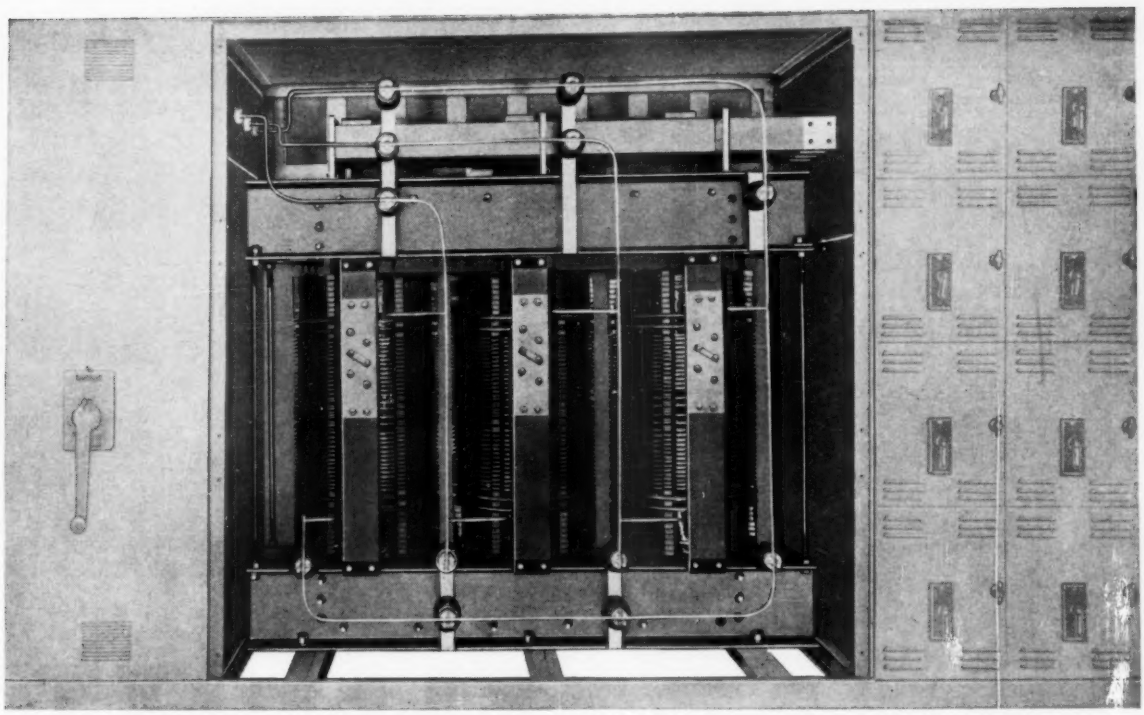
The transformer is the heart of a substation



1000 Kva 13,200 volt Sorgel dry-type transformer in a substation — (compartment panel removed)

500 Kva, 3-phase, 4160 to 480 Volt
Askarel-cooled transformer,
with primary and secondary throats

A substation is no better than its transformer; therefore, it is important that the transformer is of the best quality — a SORGEL transformer, either dry-type or Askarel-cooled.

Sorgel transformers are top quality, time tested, and are thus recognized and accepted by discriminating engineers and users. Their rugged construction assures continuous, reliable service. Their design is liberal. Efficiency is high. Quiet operation.

The Sorgel Electric Co. has 40 years of experience in the development, manufacturing and application of transformers.

Sorgel transformers, sizes 100 to 3000 Kva, all voltages up to 15,000 volts, either dry-type or Askarel-cooled, are procurable with any make or type of switchgear, and from any substation manufacturer.

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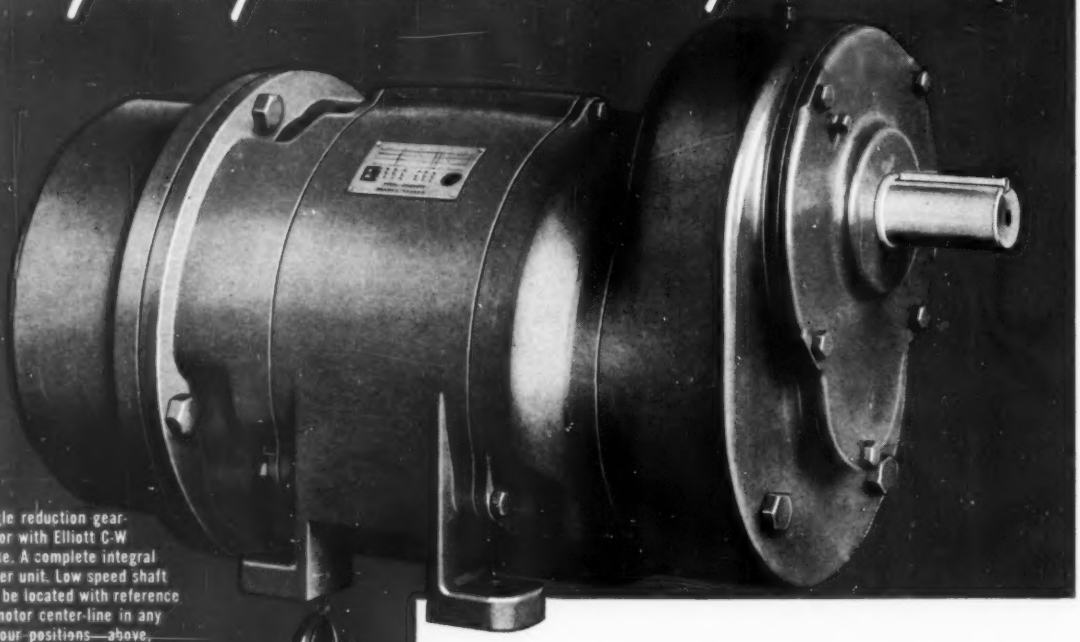
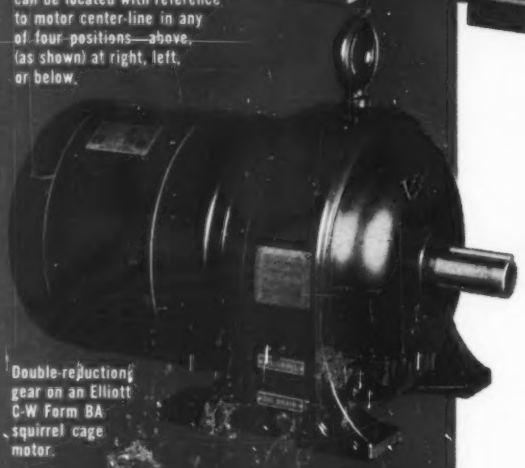


Single reduction gearmotor with Elliott C-W brake. A complete integral power unit. Low speed shaft can be located with reference to motor center-line in any of four positions—above, (as shown) at right, left, or below.



Double-reduction gear on an Elliott C-W Form BA squirrel cage motor.

Triple-reduction unit mounted on an Elliott C-W totally-enclosed fan-cooled "Sealedpower" explosion-proof motor.

W3-10

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CROCKER-WHEELER
Gearmotors

Here is a complete line of motors with built-in reduction gear units which covers practically every need.

Available in any motor type, any enclosure, any mounting, in frame sizes from 1 to 150 hp.

Single reduction, 780 to 280 rpm... double reduction, 230 to 45 rpm... triple reduction, 37 to 7.5 rpm.

Construction features include precision processed, file-hard gears, large oil reservoir for abundant splash lubrication, heavy, rigid cast iron pyramidal base, and a bearing housing and oil seal *separating* the inner high speed motor bearing from the gear lubrication, which after much service may contain minute metallic particles tending to shorten bearing life.

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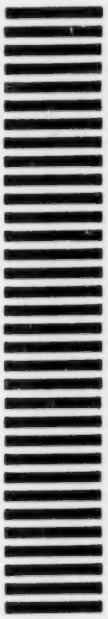

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BULLETINS

(Begins on page 21)

MATERIALS HANDLING

155 **Conveyor Belt Chart**—Engineering data for standard conveyor belt constructions is given in this chart and accompanying sheet. Strength characteristics of eight popular ply and material combinations of conveyor belt constructions are provided. Each property is printed on the chart in a different color to facilitate comparison. Properties are expressed in pounds per inch of width, so that total strength of belt may be obtained by multiplying figure from the chart by belt width. Quaker Rubber Corp., Div., H. K. Porter Co., Inc.,

156 **Industrial Tractors**—Bulletin 544 presents company's line of industrial tractors, available in four models to meet a wide range of requirements. Describes a walking type, a sit-down riding type, a standup riding type, and a remote controlled type of tractor. Specifications are included. Barrett-Cravens Co.

157 **Hydraulic Crane** — Company's indoor-outdoor hydraulic crane is described in 8-pp illustrated Bulletin AD-2253. Included with specifications and performance data are diagrams on working ranges, manual boom extensions, minimum aisle widths for turns. Also describes attachments and special equipment. Austin-Western Co.

158 **Centrifugal Thrower Units** — Eight-pp Bulletin 854 covers fixed and portable Swiveloaders for loading or storing bulk materials, and features a new HiType for loading over grain doors of box cars at capacities to 150 tons per hour. Illustrated with photos of units in action and of typical installations, includes operating and installation information. Stephens-Adamson Mfg. Co.

159 **Improved Tire Tracks**—Easily put-on and removed tire tracks are presented in illustrated Bulletin TR-3. Photos show single and dual tire-track assemblies from component parts. Applications for the tire-tracks are also illustrated and specifications provided. The Union Chain & Mfg. Co.

INSTRUMENTS, CONTROLS

161 **Miniature Instruments**—Twelve-pp Bulletin 7201 describes and illustrates company's quick-connect Tel-O-Set miniature recorder and controller. Details on the design of the instruments and their operation are provided and specifications are included. Minneapolis-Honeywell Regulator Co.

162 **Plug Valve Actuator**—This 8-pp bulletin introduces a line of plug valve actuators used for the remote control of all types of wrench-operated plug valves from 1 to 8 in. Illustrated with photos of typical installations and detailed drawings, the bulletin gives complete engineering data and information on how the plug valve actuators are used. Includes ordering information. Pantex Mfg. Corp.

163 **Improved Flow Meter**—Catalog 5001 shows construction of the Critiflo-Meter for measurement and control of steam and gases. Outlines operating principle, explaining how flow is indicated by upstream pressure alone, regardless of fluctuations in downstream or process pressure. Various ways of applying the instrument are described, along with advantages, specifications. King Engineering Corp.

164 **Guide to Rotameters** — Bulletin 110b includes general data on various models of company's rotameters and describes their operation and application. Offers specifications on indicators and transmitting extensions, Flowmizers—low cost meters for noncorrosive services—and on laboratory kits available for research and pilot plant applications. Meters for low and high pressure flows are also described. Brooks Rotameter Co.

165 **Precision Air Control**—Eight-page Bulletin AV 300R illustrates and describes company's Electroaire valve. Describes all parts and functions of the packaged air control unit, and includes installation photos, dimensional drawings, and specification data. Schematic wiring diagrams are also shown, and details on the explosion-proof model of this valve are given. The Bellows Co.

166 **Temperature Control**—Bulletin 104 features the Model D-1S temperature control, which operates by the differential expansion of solids and is designed for those installations where the temperature setting must be frequently and easily changed. Specifications and a diagram showing construction details are included. Burling Instrument Co., Inc.

167 **Gas Analyzers** — Twenty-pp Brochure 0703-3 contains part-by-part descriptions of the components of combustible gas analyzers and alarms. Installations in varied industries are covered, and a method of designing a combustible gas alarm system is shown schematically. Instruments to protect against most of the known combustible gases and vapors are described. Mine Safety Appliances Co.

168 **Controls for Petroleum Lines**—Bulletin PL-1 discusses problems involved in transport-lines. First in a series, bulletin describes in general terms, a typical pipe line system, the variables to be measured, and some of the problems of pipe line control. Includes many diagrams to illustrate various aspects of pipe line systems. Minneapolis-Honeywell Regulator Co.

169 **Flame Failure Protection** — Sixteen-pp Fireye Bulletin CF-30 describes a system for protection against explosion hazards of burning fuel in light oil, gas, and combination oil/gas burners. Lists specifications and gives installation and application details. Many diagrams help to illustrate construction and operation of the system. Includes diagrams on mounting dimensions, installation wiring, programming sequence, internal and external wiring, and cam and relay contact identification. Relay operation is explained and details on installation provided. Combustion Control Div., Electronics Corp. of America.

170 **Servo System**—Technical Reference 54B describes a recently-developed servomechanism system. Gives construction details, lists operating characteristics, and includes photos and engineering drawings of key parts. Diagrammatic layout shows how parts are hooked up. Also explains how remote recorders and tape printers may be synchronized with servo units. Richardson Scale Co.

171 **Selective Telemetering** — A method of securing information on power flow, oil pressure, bus voltage and other values required for remote operation of substations, pumping stations etc. is described in Technical Bulletin ATIC-929, 12 pp. It tells how a compromise can often be made to provide some information continuously while other data can be selected when needed by operator. Explains how shared use of telemeter communication channels with supervisory control systems that permit remote control of valves, motors etc., cuts original equipment costs and space requirements and affords shared use of instrumentation. Motorola Communications & Electronics Inc.

To order these bulletins circle item numbers on the handy Reader Service Cards provided on the facing page.

172 **Closed Circuit Television** — "How to Read a Blueprint at 500 Ft." tells how closed circuit television is applied to achieve effective work coordination and two-way visual communication between widely separated buildings. Describes simplicity and functions of "TV Eye," outlines some general applications, and describes accessory equipment for special applications. Engineering Products Div., Radio Corp. of America.

WATER TREATING

173 **Water Conditioning Equipment**—Bulletin 6210 is an illustrated condensed catalog covering company's line of demineralizers; hot process, hot lime zeolite and zeolite softeners; reactors; deaerators; dealkalizers; filters; continuous blowoff systems; control and relief valves; separators; purifiers, and other equipment. Includes references to more detailed booklets available on the various products illustrated. Cochrane Corp.

174 **Cooling Water**—The dangers of scale and corrosion in cooling systems and organic contamination of cooling system water are outlined in this 6-pp folder. It relates solutions found to cooling water problems in an oil refinery, a steel plant, and other industries. Hall Laboratories, Inc.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

175 **Air Tools**—Bulletin 38-A is a 56-pp ordering guide and handbook on air tools for the foundry, mill production line and assembly plant. Illustrated with photos, cutaway drawings, descriptive text covers features and applications of the tools; specifications are included. Presents screw drivers, nut setters, sanders, drills, grinders, rammers, chippers and scalers, impact wrenches. The Rotor Tool Co.

176 **Drill Instruction Manual** — Sixteen-pp illustrated "Operations and Service Manual" describes technical operations and maintenance of manufacturer's Series 24 automatic drill unit. Various sections cover theory of operation, controls, component operation, sequence of pneumatic operation, set-up instructions, sequence drilling, and other subjects. Provides a handy reference service chart, also a table of recommended pressures and speeds gives dial settings for reference when working with different size drills. Dumore Precision Tools.

177 **For Better Welding**—"How to Overcome Your Welding Problems and Improve Your Welding Techniques" is an 8-pp practical manual for those who wish to increase their welding skill and for plant engineers who want to gain insight into the problems facing the maintenance welder. Covers such matters as the causes of stress raisers, starter cracks and hard spots. Shows, by illustrations, how weld failures can be avoided if consideration is given to joint design to allow for multi axial stresses. Eutetic Welding Alloys Corp.

178 **For Tool Room Grinding**—This brochure covers a new line of tool room wheels and lists some hints for conservation of tools. Includes a handy tool room chart which spells out recommendations for grinding high speed tool and die steels. The Carborundum Co.

179 **Shock Isolators**—Eight-pp Product Bulletin 541 describes features and uses of company's Type 5200 shock and high vibration isolators. Gives load ranges of these amounts, and provides graphs on isolator loads, shock and vibration transmissibility and coupled natural frequencies. The Barry Corp.

180 **Magnetic Screw Holding Devices**—This 24-pp manual describes a line of magnetic screw holding accessories for power screw drivers and nut setters. Tells how to utilize the force of high energy permanent magnets for holding screws, bolts, or nuts in assembly operations. Simplified tables graphically show how to select proper magnetic driver or finder after considering screw size, type of driving recess and amount of clearance available. A section on company's hand screw drivers is also included. Magna Driver Corp.

181 **Flexible Shaft Machines**—Eight-pp Catalog 51 describes and illustrates flexible shaft machines of variable and constant speed types, as well as flexible tool and power shafts and shaft accessories. Provides sizes, specifications and suggestions for use. Stow Mfg. Co.

182 **Machine Tool Lubrication** — A special lubricant for the ways of machine tools is described in this bulletin. Explains how it is compounded to eliminate stick slip, and how it doesn't squeeze out or form gummy deposits and helps to keep machines clean. Sun Oil Co.

183 **Vibration Isolators**—Illustrated Bulletin 541 describes benefits that industrial plants can derive through mobility of their machines, with the aid of company's new machine mount. Gives results of a timed test involving the relocation of a production line in 23 minutes, demonstrating the savings in time, money and labor afforded. The Barry Corp.

METAL WORKING

184 **Milling Machines** — Twenty-pp Catalog M1870, handsomely illustrated in color, introduces manufacturer's new Toolmaster milling

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BULLETINS

(Begins on page 21)

machine available in three styles—manual feed to quill, power feed to quill and heavy duty head. Booklet details design highlights and accruing benefits, describes exclusive features of the line. General specifications, dimensions are provided: standard equipment and extras are also listed. The Cincinnati Milling Machine Co.

185 **Two-Point Presses**—Catalog 2018, 8-pp, describes Steelweld two-point presses of the straight-side, tie-rod type. Discusses main features and points out construction details. Photos, diagrams, and full specifications on all models are included. The Cleveland Crane & Engineering Co.

186 **Broaching Fixtures**—Twelve-pp Catalog B54-9 describes self-contained, air-powered bench-type broaching fixtures. Describes and illustrates in detail, with photos and line drawings, several different typical applications of the fixtures. Several pages are devoted to "idea" line drawings of typical part shapes adapted to broaching on self-contained broaching fixtures. National Broach and Machine Co.

ENGINES, GENERATORS

187 **Engine-Generator Sets**—Eight-pp Bulletin G-6 presents engines from 60 to 675 hp with generators capable of producing from 50 to 350 kw—custom built sets for dependable, low cost stand-by power. Drawings show basic dimensions and charts give maximum, intermittent and continuous horsepower in kilowatt ratings at varying rpm's. Le Roi Div., Westinghouse Air Brake Co.

188 **Diesel Engines** — Twelve-pp Bulletin 235 describes 29-in. bore diesel engines which range in size from 4500 to 10,800 hp. Shows these engines installed in municipal central power stations, public utilities, industrial plants. Points up savings that may accrue from the use of straight run or cracked residual fuels. Photos and cross sectional drawings show construction details. Nordberg Mfg. Co.

OTHER EQUIPMENT

189 **Fans for Air, Materials Handling**—Bulletin 702 introduces company's Type XL fans for industrial air and materials handling applications. Illustrated, presents design and operational details on these large fans. Includes general data, also performance data at other standard conditions. Clarage Fan Co.

190 **Precision Threaded Fasteners** — Company's line of precision threaded fasteners is described in this 32-pp illustrated catalog, which stresses savings in costs and delivery time gained by specifying and ordering standard fasteners. Includes socket screw products, socket head cap screws, self-locking set screws, shoulder screws, flat head socket cap screws and button head socket screws. Tables listing specifications and information on quantity per box and shipping weight are included. Diagrams and cutaway drawings point out the special features of each product. Standard Pressed Steel Co.

191 **Combination Burners**—Bulletin 176 describes and illustrates fully automatic oil-gas burners of the horizontal rotary-nozzle mix type designed to permit instant change from one fuel to another. Gives design details and electrical characteristics, includes specifications. Also presents an extension front for conversion installations. Preferred Utilities Mfg. Corp.

192 **Magnetic Separator Equipment**—Illustrated 16-pp Catalog 17 describes company's line of permanent, non-electric magnetic equipment—the Magnalarm, plate magnets, magnetic humps, grate magnets, pipeline traps, micromagnetic separators, magnetic pulleys, and others. Includes information on installation, technical data, specifications and available sizes. Eriez Mfg. Co.

193 **Chain Products** — This 16-pp catalog presents a line of chain and related products in detail and illustrates link sizes for every type. Information includes size number, metal thickness, approximate links per foot, link width, tensile strength, and shipping weight in tubularized form for each size and type, packing, and metals and finishes in which the chain is available. Covers such items as sash chain, sash chain attachments, single and double jack chain, furnace chain, ball chain and accessories, and others. Describes company's Quick Pull-out bag package. John M. Russell Div., Risdon Mfg. Co.

194 **Internal Purifiers** — An internal type purifier (scrubber) for delivering clean vapor and gases from steam drums, flash tanks, evaporators, packed towers, bubble-cap towers, deodorizers, and stills is described in Condensed Bulletin 103. Contains dimensional drawing illustrating the use of purifiers inside two typical installations, steam drums and bubble-cap towers. It also has a cut-away drawing illustrating flow of vapor through the unit, a dimension table. The V. D. Anderson Co.

195 **To Recover Colloids**—Technical Publication CS2, 8-pp, discusses Colloidair systems for recovery of suspended materials from process liquors and for waste water treatment. Catalog features factual data on the efficiency of the Colloidair process, flow sheets of typical installations, descriptions of operating principles, and an analysis by types of industries of various applications for the systems. Bulkley, Dunton Processes, Inc.

196 **Centrifugal Pumps**—Bulletin 854, 6-pp, covers six standard models of Impervite impervious graphite centrifugal pumps ranging in size from 25 to 2000 gpm at 20 to 100 ft head. Includes parts drawings, dimensional drawings, and performance charts for each model. In addition, chemical and physical properties of Impervite impervious graphite are listed. Falls Industries, Inc.

197 **Hydraulic Cylinders**—Bulletin 54, 8-pp, features company's line of hydraulic cylinders. Discusses construction details and presents a table of installation dimensions for various models available. Includes a table of basic cylinder dimensions and engineering information. Hydro-Line Mfg. Co.

198 **Laboratory Ovens**—Twelve-page Catalog A describes gravity and mechanical convection laboratory ovens and sterilizers, and discusses the relative merits of gravity and mechanical air flow. The Multiplex and Duplex close tolerance temperature controls are discussed and illustrated. Also shown are: single hydraulic thermostat, type of hardware, nickel-chromium heater banks, insulation and turbo-blower. Information on explosion-proof floor and bench models — electrical specifications, construction details, operating principle and ordering information—is included. Modern Laboratory Equipment Co., Inc.

199 **Polyethylene Closures**—Describing fully the CaPlug line of threaded and non-threaded polyethylene caps and plugs for safeguarding products in process storage and transit, this fact file folder is punched for easy filing. In it are price lists for 100 stocked sizes of the five standardized designs used to protect tubing, fittings, valves, and machine parts. CaPlugs Div., Protective Closures Co.

200 **Side Dump Stokers**—This 6-pp bulletin points out advantages of company's moving grate side dump stokers, such as sturdy construction and practical operation. Describes a hydraulically powered and a steam drive unit, and includes photos, diagrams, and specifications. Riley Stoker Corp.

201 **Refractory Grain**—Form 1741, a 24-pp bulletin, discusses properties of Alundum fused alumina, Crytolon silicon carbide, Magnorite fused magnesia, fused zirconia, and Norbide boron carbide. Technical information about these products includes melting points, electrical properties, physical characteristics, typical analysis, grain sizes available, present and possible future applications, graphs, tables and technical charts. Norton Co.

202 **Fluid Power Equipment** — Twelve-pp Bulletin 10051-D illustrates and describes company's line of fluid power pumps, motors, transmissions, cylinders and valves. Features a new electric-hydraulic servo control system for pumps and transmissions up to 150 hp, a new line of Oilgearducers for constant torque drives. The Oilgear Co.

203 **Packing, Sealing Compounds** — Self-molding packing and sealing compounds are described in this 8-pp pocket-sized folder. Dramatizes losses sustained through unnecessary leaks, and shows how such losses may be eliminated. Describes packings as pencil- or washer-shaped pieces, which are bent or broken and pushed into stuffing-box. Gland follower is then tightened until a solid bushing is formed. Surveys, Inc.

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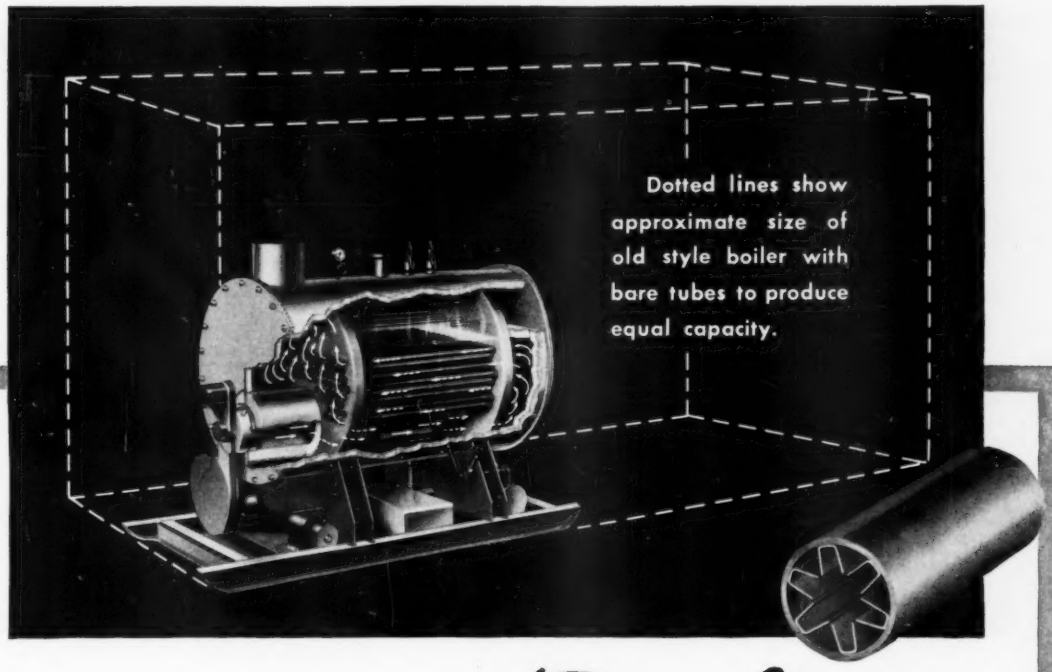

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MECHANICAL POWER TRANSMISSION

301 **Power Transmission Equipment**—Form 118, 24 pp, gives descriptive and technical information on variable speed pulleys, wide V-belts, sheaves, motor bases, countershafts, and Select-O-Speed transmissions. Illustrated with photos and dimensional drawings, booklet provides ratings, sizes, application and installation tips. Lovejoy Flexible Coupling Co.

302 **Flexible Couplings** — Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings. Tells advantages of these couplings and discusses design principles. Double-flexing and floating shaft types, light duty couplings and types for special applications are described and pictured in detail. Thomas Flexible Coupling Co.

303 **Improved V-Belts**—This literature on company's Vulco rope drives explains how this rope with concave sides is designed to fill out to a precise fit in the sheave groove, to provide less wear, more pulley contact and more sure power when needed. The Gates Rubber Co.

304 **Roller Chains, Sprockets**—Catalog 754, 64 pp, describes, illustrates a line of roller chain stock sprockets, including minimum bore sprockets for reboring, also finished bore and Taper-lock bushed sprockets which are ready to use. Tables show speed ratios for sprocket combinations, standard keyways and setscrews. Includes chain selection and application data, installation and lubrication recommendations, chain length calculations, dimensions and price lists for single and multiple strand roller chains. Diamond Chain Co.

305 **Conveyor Belting** — Folder 54-3, contains a capsule description of construction, types of treated stitched canvas belting for all conveying and elevating applications. Describes company's general conveyor and elevator belt, oil- and acid-resisting belts to handle hot materials to 600 F. Imperial Belting Co.

306 **Chain Drives**—Catalog 154, 20 pp, explains operating characteristics, service factors of manufacturer's pre-selected drives; how to select the proper drive; lubrication and maintenance. Tables give specifications, prices, hp capacities. The Ramsey Chain Co., Inc.

307 **Coupling or Converter** — To promote a better understanding of hydraulic couplings and torque converters, this 32-pp publication tells where couplings or torque converters should be used, and why, furnishing a source of facts on non-technical terminology. Covers meaning of torque and its effect on driving and driven equipment. Twin Disc Clutch Co.

308 **Shaft Mounted Drives**—Plant engineers who use machines requiring input speeds between 420 and 10 rpm in the range between ½ and 30 hp, will be interested in 8-pp Bulletin 7101. Contains complete information—design data, selection tables, dimensions, weights, installation photos—on this modern type of standard gear drive designed for high ratios of speed reduction in limited space, with savings in initial and installation costs. The Falk Corp.

ELECTRICAL EQUIPMENT

309 **Motor Panorama** — Motors and generators — about 50 types in all — are pictured in Publication AEB 100.8B, which serves as a handy reference, since it lists specific literature dealing with each motor shown. Gives general construction details of each unit. Fairbanks, Morse & Co.

310 **Variable Speed Motors**—Sixteen-pp Bulletin 1797, revised, outlines many reasons why variable speed motors can be used to improve production, and it includes illustrations of all types of company's Varidrive motors, as well as their mechanical features, remote controls, etc. U. S. Electrical Motors, Inc.

311 **Motor-Generator Reference Book**—Publication 51R7933 is a 50-pp booklet compiled to assist in the selection of motive power to handle most industrial applications. Neither text book nor ordering catalog, this book provides a brief outline of the various types of motors, generators and motor-generator sets, telling their application and operating requirements. Booklet is generously illustrated and includes performance data, ratings, information on methods of speed control, also general characteristics. Allis Chalmers Mfg. Co.

312 **Motor Lubrication Tips**—"To Grease or Not to Grease" is an illustrated bulletin on lubrication of ball bearing motors. Gives general information on lubricants and lubricating agents. Discusses importance of lubrication to bearing life. Also covers choice of lubricant and procedure. Wagner Electric Corp.

313 **FHP Manual Starters**—Bulletin 224 is a folder giving the features and ratings of a line of fractional horsepower manual starters. Lists applications for them and pictures enclosures. Square D Co.

314 **Motor Starters**—Booklet 1062, 16 pp, describes motor starters having short circuit protection for 2200- to 5000-v systems. Illustrates starters using company's 50,000 kva interrupting capacity type ZHS contactor; also starters which will safely interrupt the circuit from a bus of unlimited capacity. Indoor and outdoor installations are pictured. The Electric Controller & Mfg. Co.

315 **Small Bus Duct**—Detailed information on a midget-size bus duct is contained in Bulletin 703. Illustrates entire unit, also trap and hanger. Text discusses major parts, design features. Includes list prices. Frank Adam Electric Co.

316 **Motor Control**—Company's line of relays, contactors, and starters is presented in 28-pp Catalog CS-28. Text and illustrations show greater accessibility, simplified wiring, unit construction and other design features which contribute to the easier installation, improved performance and longer service afforded. Booklet also discusses overload protection provided, and includes specifications and wiring diagrams. Cutler-Hammer, Inc.

317 **Cartridge Fuses** — Form S-60, 12 pp, describes and illustrates manufacturer's dual-element cartridge fuses designed for long and controlled blowing time. Lists benefits afforded by these fuses and gives data on both ferrule type and knife-blade type. Provides selector table covering sizes of fuses for protection of single-, two-, and three-phase motors of 1/6 to 200 hp. Also includes time current curves. Economy Fuse & Mfg. Co.

318 **Air-Cooled Transformers**—Eight-pp Bulletin 153-A describes air-cooled dry-type transformers, stressing their advantages and listing typical applications. Illustrates, and gives construction details and specifications for standard types. Also pictures some special transformers and reactors. Sorgel Electric Co.

319 **What You Should Know About Circuit Breakers**—Sixteen-pp Manual 101 explains operating principles of basic circuit breaker designs and provides engineering data on factors of application. Includes simplified diagrams of three basic types. Illustrates with colored charts and diagrams, explains temperature factors, inrush current effects, tripping and reset time. Heinemann Electric Co.

320 **Productive Maintenance — Publication** GED-1691 is a pocket-size 104-pp source of information of value to plant engineers who want to get more production from their present motors, generators and control equipment. Besides general maintenance suggestions, the booklet contains trouble shooting charts and recommended renewal parts guides. Also provides wire and cable data and includes a section of formulas and other data pertaining to motors and generators. General Electric Co.

321 **Plug-In-Power**—Sixty-pp Catalog 25 offers real help on electrical installation problems involving portable tools, materials handling equipment, cranes, hoists, cutting equipment. Covers a prefabricated trolley busway electrical distribution system to provide outlets for power or light where needed. Feedrail Corp.

322 **The Answers on Wiring**—"20 Questions and 20 Answers on Safety m.i. Wiring" describes and illustrates characteristics and advantages of this new wiring system. A complete table of types, sizes, weights, and lengths, as well as a partial list of users included. General Cable Corp.

323 **Power and Control Cables — Sixty-pp** Catalog 24 describes typical power and control cable designs and is intended as a guide in selecting proper wire and cable type. Describes insulations, sheaths and coverings, electrostatic shielding, and includes product data on all types listed. Rome Cable Corp.

324 **Handbook on Storage Batteries**—This 64-pp booklet of instructions and technical data is the sixth edition of this company's battery service manual. Provides a brief treatise on the theory of the lead-acid battery. Gives detailed instruction on the care and operation of batteries, on maintenance and repairs, and on standard and special parts. Booklet is of special value to plant engineers concerned with storage batteries for cycle service in industrial trucks and materials handling equipment. Gould-National Batteries, Inc.

325 **Flexible Cords** — This well-illustrated 24-pp booklet includes all new Underwriters' classications for flexible cords manufactured by this company. Featuring data on Dynaprene and rubber jacketed cords as well as braid covered types, also gives tips on how to select proper cord. Whitney Blake Co.

326 **Commutator, Slip Ring Maintenance** — This practical little 40-pp handbook gives procedures and methods for commutator and slip ring maintenance. Generously illustrated with photos and sketches, booklet contains sections devoted to common troubles and their correction; brushes; general maintenance; and company's products for maintenance of commutators and slip rings. Defines commutator terminology. Ideal Industries, Inc.

LIGHTING, COMMUNICATION

327 **Selection Data on Lighting Fixture Hangers**—Catalog 50, 80 pp, contains general and detailed information on disconnecting and lowering lighting fixture hangers, accessories, special devices and parts. Utilizes 247 photos and drawings to show construction principles, operating features, installations, modifications and component parts for both indoor and outdoor units. The Thompson Electric Co.

328 **Precision Lamps** — Bulletin 40 offers application and purchasing information on various types of lamps carried by manufacturer. Flood, infra-red, spatterproof, and weatherproof lamps are briefly discussed. Radiant Lamp Corp.

329 **Lighting Fixtures**—New Section K of Condulet Catalog 3000 describes components, performance data, and methods of relamping for any of the manufacturer's new EV series explosion-proof and weather resistant lighting fixtures. It contains illustrations showing steps for easiest relamping and installation of this type of fixture. Crouse-Hinds Co.

330 **How to Use Sound Signals**—This new 44-pp combination manual, data book and catalog is an excellent reference work on industrial sound signals. Includes a simplified explanation of fundamentals of sound; a glossary of sound and signal terminology; a quick-comparison guide for selecting equipment; suggested steps in choosing a signal installation, and hints for compiling a code signal call system. Benjamin Electric Mfg. Co.

331 **Two-Way Radio**—This 6-pp folder on mobile radio for industry details uses, describes, illustrates three models, accessories. Bendix Radio, Div., Bendix Aviation Corp.

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a tough, corrosion-resistant plastic with a good cost factor

Dur-Ace is a new corrosion-resistant, rigid plastic pipe with exceptional impact strength and toughness . . . good for handling most corrosive fluids in your plant at moderate temperatures and pressures . . . with low first cost and long life.

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***Dur-Ace** is the eighth basic type of corrosion-resistant pipe available from ACE . . . including materials for high pressures, high temperatures, strong acids, organic solvents, etc., and pipe sizes to 24" and above. Consult ACE first with any corrosion problem.*

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*Water costs (figured at $1.90 for 1,000 cu. ft.) authenticated by Hackensack Water Co. **Fuel costs authenticated by American Gas Association.

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Built like a tire with Fiberglas reinforcement

Easy-Tite faucet washers are made of a special du Pont product, instead of rubber, and reinforced with Fiberglas. The result is a washer that resists the closing squeeze that splits and mushes ordinary washers. And Easy-Tites withstand destructive heat (up to 300° F. by test). These features explain why *'Sexauer' Easy-Tites outwear ordinary faucet washers 6 to 1!*

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DATA FILE

(Begins on page 150)

VALVES, TRAPS, PIPING AND ACCESSORIES

332 Bronze Valves—Globe and angle bronze valves with rising stems, union bonnets and stainless steel plug type seats and discs are described in this bulletin. Discusses design advantages, gives dimensions. Walworth Co.

333 Valves and Fittings—Illustrated Catalog 47 provides over 60-pp of ordering information and application data on valves and fittings made of stainless steel and other corrosion resistant alloys designed for use where corrosion or contamination are factors. Gate, globe, and angle valves for a wide range of services are presented, also needle valves, sampling valves, screwed and flanged fittings. Design and construction details are shown. Also included is a chart of first and second recommendations of alloys for corrosive media. Alloy Steel Products Co., Inc.

334 Relief Valves — Twenty-pp Publication 5200 is replete with data on company's multiport relief valves for steam, air and gas service. Charts, diagrams, tables and examples of plant operating conditions serve to show how to select a relief valve. Text and illustrations show advantage of these valves over other relief valves, and booklet also shows how the Multiport relief valve can be used as a differential pressure spillover valve or a check valve in closed systems. Cochrane Corp.

335 Choosing the Right Valve Presenting valve selection as a matter of matching the valve's service characteristics with the service requirements of the job, this practical 20-pp booklet explains and illustrates basic design features of gate, globe and check valves. It tells in non-technical language, how each of these valve types works, and where it is best suited for use. Disc, stem connection, bonnet and bonnet-joint characteristics are also discussed and the importance of stem operation is treated. A final chapter is devoted to common materials of valve construction. Crane Co.

336 Valve Maintenance Guide — "Prevent Valve Failure Before It Starts," is a 28-pp text on valve selection, installation, inspection. Pictures damaged valves, explains how damage could have been prevented, discusses maintenance schedules, inspection jobs, lubrication, pipe line checking, threading, regrinding, disc replacement. Jenkins Bros.

337 For Quick Valve Selection—Here's a 20-pp catalog digest providing ordering and application information on gate, globe, angle and check valves in bronze, iron, cast and forged steel construction, also valve accessories and parts. Illustrated, includes pressure-temperature chart. The Ohio Injector Co.

338 Bronze Gate Valves—Illustrated Circulars 534 and 574 describe a line of 150- and 200-lb service pressure bronze gate valves. Complete with dimensions, these circulars give advantages of flange and screw gate valves in rising and non-rising stem types. The Lunkenheimer Co.

339 Stream Trap Solutions—Bulletin F.151, 36 pp, is the newest edition of this company's well known booklet, "Solving Steam Trap Problems." Organized for easy reference, this illustrated booklet provides specifications and capacities of steam and float traps, air release valves, pipe line strainers. Tells how to calculate condensation loads and select traps for unit heaters, jacketed kettles, submerged surfaces. Gives pointers on installing and servicing traps. Also included in this edition is information on combination float and thermostatic traps. The V. D. Anderson Co.

340 Steam Trap Book—Catalog J, 44 pp, includes physical data and prices on cast semi-steel and forged steel inverted bucket steam traps, compound steam traps and ball float air and air relief traps; a handbook section explaining how to calculate condensate loads and select traps for all classes of equipment; a maintenance section. Armstrong Machine Works.

341 Lightweight Pipes—As a practical help to pipe users, Bulletin 507 shows typical ap-

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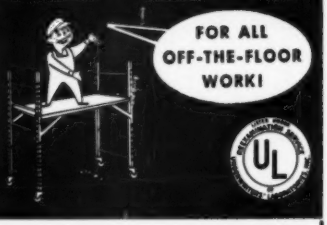

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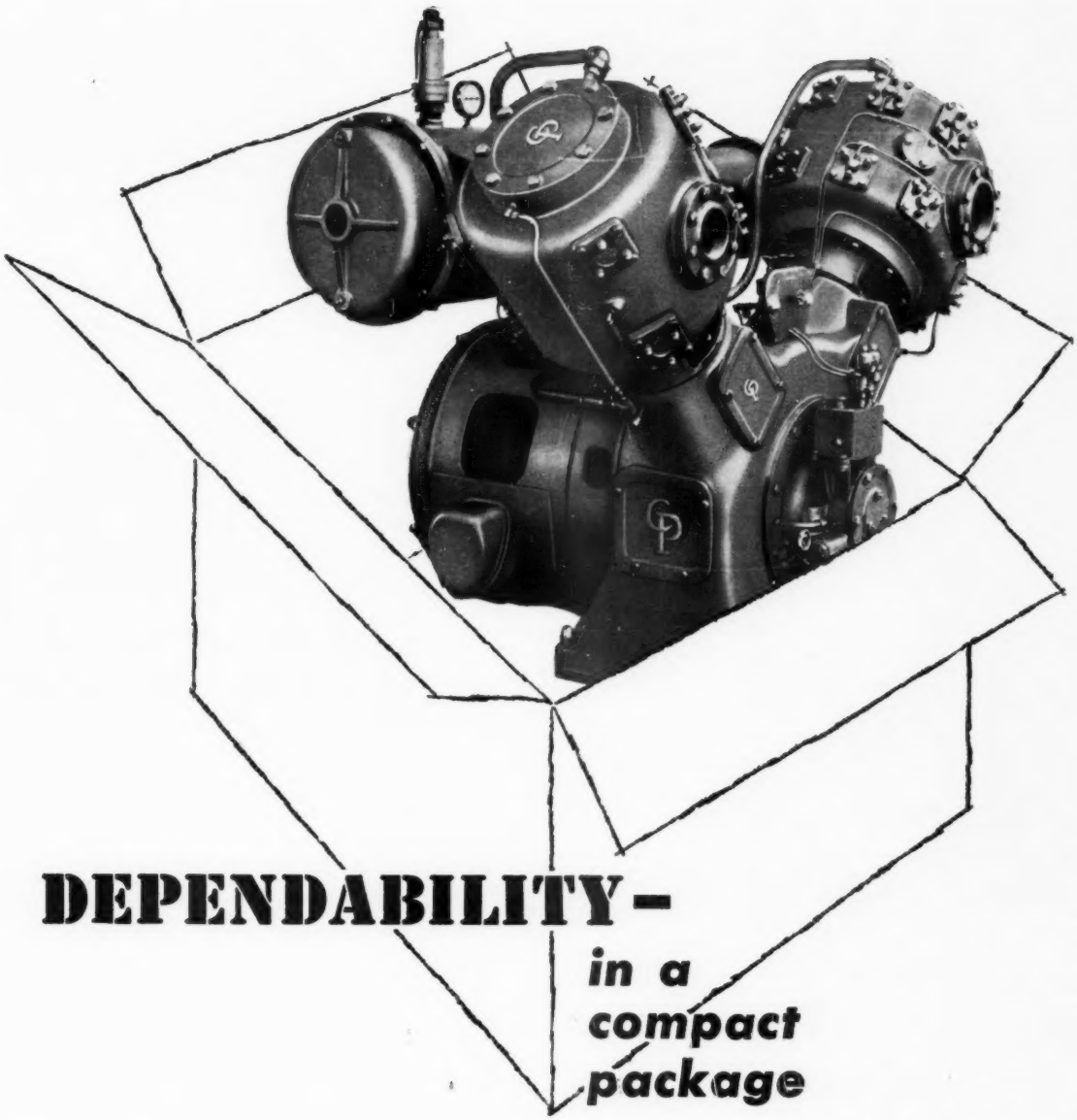

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DATA FILE

(Begins on page 150)

plications of company's light-weight lockseam-spiralweld pipe and fittings. Includes standard specifications on pipe from 4- to 3-in. diam., also data on fabricated fittings, flanges, connections. Naylor Pipe Co.

342 **Jacketed Piping, Cocks**—Twelve-pp Bulletin 152 discusses the special advantages, problems and requirements of jacketed piping, installations and shows how manufacturer's jacketed piping, cocks, fittings and relief valves are designed to fulfill requirements. Illustrated with photos and drawings, includes specifications. Parks-Cramer Co.

343 **Piping for Permanence**—In presenting corrosion fundamentals of plumbing and heating systems, this 32-pp illustrated booklet contains data based on analysis of thousands of wrought-iron piping systems. Chapters are devoted to requisites of a piping material, building-piping systems, and water and its problems. Includes many service records. A. M. Byers Co.

344 **Handbook on Fittings, Flanges**—Catalog wf-1950, 68 pp, offers working information on seamless carbon steel welding fittings and forged steel flanges. Includes dimensional tolerances, thread standards and threading practice; service pressure, ratings, physical and chemical requirements. Grinnell Co., Inc.

Postage-free Reader Service Cards make it easy to order catalogs. Cards are provided on pages 145 and 146.

345 **Welded Fittings**—Catalog 3 is a 36-pp ordering and engineering reference book on company's Weldolets for piping services. Gives data on butt-welding and socket welding Weldolets as well as on Thredolets for making threaded outlets. Typical installations are pictured; sizes, weights and prices provided. Also included are installation instructions and a technical section. Bonney Forge & Tool Works.

346 **Pipe Insulation**—Bulletin F 1-100 features on-the-job installation photographs of cellular glass insulation for pipe temperatures between —300 and 800 F. Complete listing of physical properties, condensed specifications are given. Pittsburgh Corning Corp.

347 **Packless Expansion Joints**—Bulletin 35-51A offers 28 pp of up-to-date information on company's Corruflex joints, their design and installation and advantages over other means of providing for thermal expansion in pipelines. Construction features are explained and illustrated; simplified selection data include tables for determining amount of expansion in pipelines. American District Steam Co., Inc.

PUMPS, COMPRESSORS

348 **Compressors** — Bulletin A72, 36 pp, gives construction, operation information on company's Class WN-114 heavy-duty air compressors. Illustrates seven models of compressor as a single unit for displacement capacties from 1186 to 1948 cfm, twin units furnishing up to 3896 cfm. Joy Mfg. Co.

349 **Compressors, Pumps**—Catalog 546, 6 pp, presents company's line of air and gas compressors, Oilfreair and Oilfregas compressors, dry vacuum pumps, aftercoolers, Aircheck valves, and centrifugal pumps for boiler feeding and general applications. Pennsylvania Pump and Compressor Co.

350 **Data on Pumps**—This 12-pp condensed catalog covers turbine-type and centrifugal pumps for a wide range of industrial uses. Gives construction specifications, capacities, application information as well as reference to specific literature on each type. Fully illustrated. Also includes data on mixed flow pumps, sump pumps. Aurora Pump Co.

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Light, easy to carry, hang up and operate, the knock-about 'Budgit' Aluminum Chain Block puts real economy into spot lifting jobs. The ¼-ton size weighs only 29 lbs. It provides fast, efficient spur-geared hoisting — a hand chain pull of only 25 lbs. lifts the full load!

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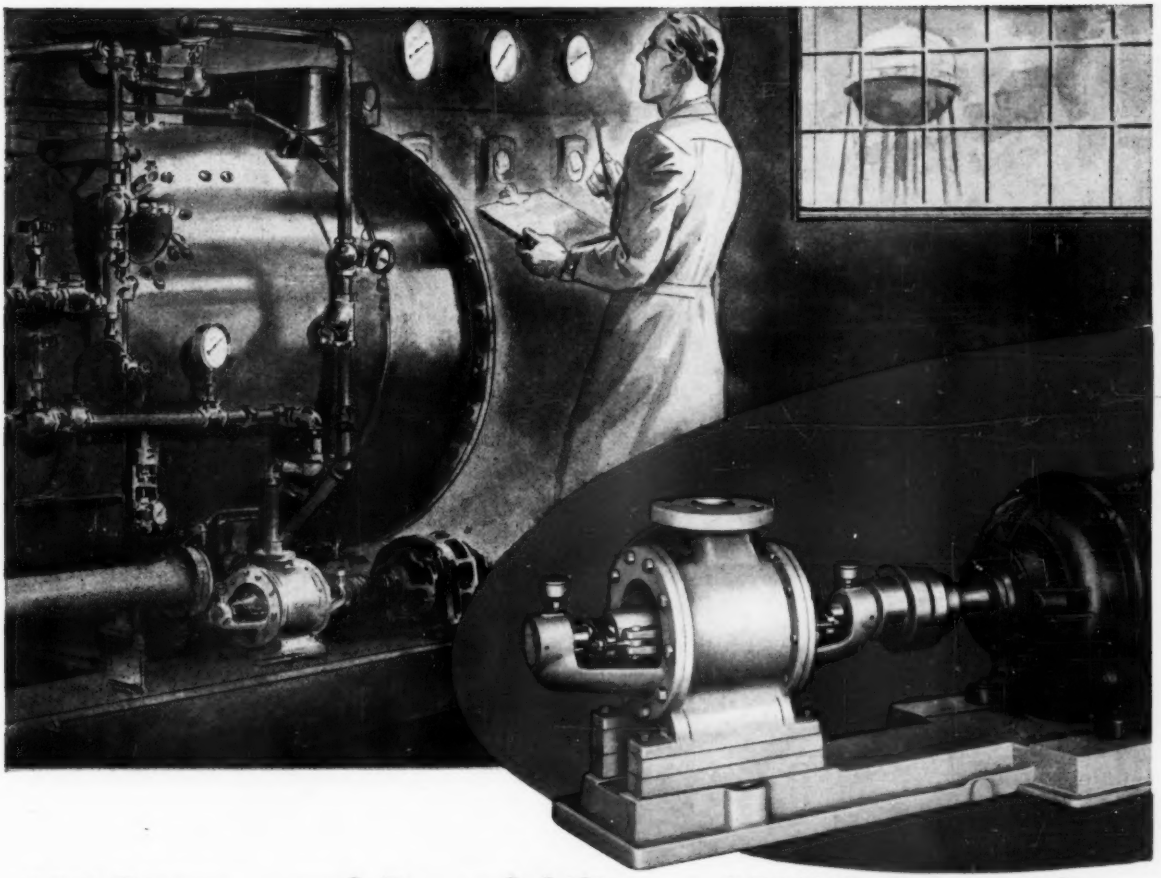

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DATA FILE

(Begins on page 150)

351 **Hydraulic Pumps** — Eight-pp Bulletin DP-300 gives features, selection data for company's dual-vane hydraulic pumps. Illustrations include drawings, cut-away photos and performance data charts. Dudco Div., New York Air Brake Co.

352 **How to Solve Pumping Problems** — A new printing of this popular 36-pp booklet makes it again available to plant engineers. Filled wih helpful technical information, explains design and operation of rotary gear pumps and discusses factors of pumping problems, covering some sample ones in detail. Illustrated, provides friction loss and conversion tables, electrical data, viscosities of liquids, construction materials for handling various liquids, resistance of valves and fittings to flow of fluids. Geo. D. Roper Corp.

353 **Installing a Pump** — Blaming many pump operating troubles on improper pump seleletion and installation, this 8-pp technical article tells what should be taken into consideration when ordering a pump. Titled "Studying the Installation," it discusses head, viscosity, pipe friction, suction lifts, horsepower and materials. Illlustrated. Viking Pump Co.

MATERIALS HANDLING

354 **Overhead Handling Equipment**—Booklet 2008-K, 12 pp, is a newly revised edition of this company's engineering and application data booklet covering overhead materials handling equipment. Describes and illustrates track drives, cranes, electrification, buckets, grabs. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

355 **Enginered Monorail Applications** — A file of application literature is announced as the beginning of a new service offered potential users of monorail equipment. Includes a technical booklet on automatic dispatch systems and an equipment bulletin in addition to several case studies of installations. As they are completed new groups of case studies will be sent to holders of file. Available to qualified plant engineers. The American MonoRail Co.

356 **Locomotive Cranes**—Catalog 84, 16 pp, stresses advantage of the torque control unit used in company's cranes and features illustrations of the mechanism and converter unit. Describes in detail the sealed, anti-friction bearings, air controls, brake, limit switch and other components. Orton Crane & Shovel Co.

357 **Overhead Handling Equipment**—Eight-pp Bulletin PU-50-G, on overhead handling equipment, illustrates pullers, hand chain hoists, trolleys, electric chain hoists, electric rope hoists, and cranes. Describes equipment and gives specifications. Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp.

358 **Overhead Cranes**—Sixteen-pp Bulletin U-200 presents underhung overhead cranes of the push type, hand geared type and motor driven type. Fully illustrated with photos of cranes and typical installations, book provides application suggestions and full dimensional data. Also covers track hangers, tracks and trolleys. Chicago Tramrail Corp.

359 **Floor Cranes** — 1954 models of this manufacturer's hydraulic floor cranes are described and pictured in the 8-pp bulletin. Shows cranes from 1000-to 6000-lb capacities, giving applications and special features of each. Ruger Equipment, Inc.

360 **Sheet Lifter** — Operational and design features of company's sheet lifting equipment, which contributes toward efficient handling, flexibility and economy are explained in Bulletin S-25, 16-pp. Cullen-Friestedt Co.

361 **Grips for Safe Handling**—Bulletin 220-B, 24 pp, pictures and gives ordering and application information on hooks, tongs, grips, and slings. Covers their use with a wide range of materials, including steel plates, pipe and round bar stock, drums and barrels, coils, cartons, baled material, timbers. Also lists chain pocket wheels and guides. Includes current price sheet. Downs Crane & Hoist Co.

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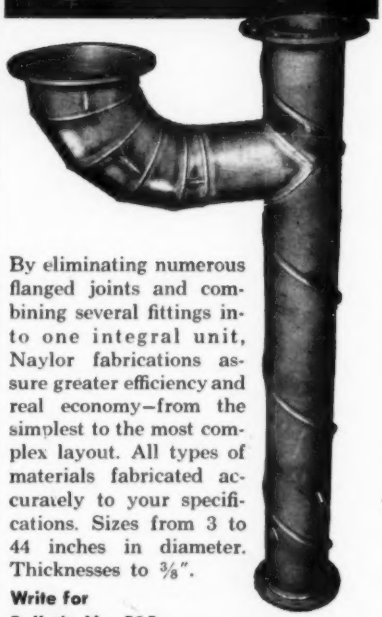

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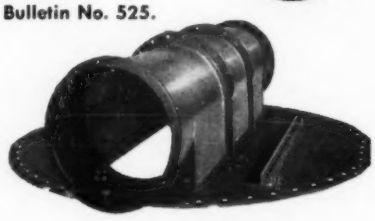

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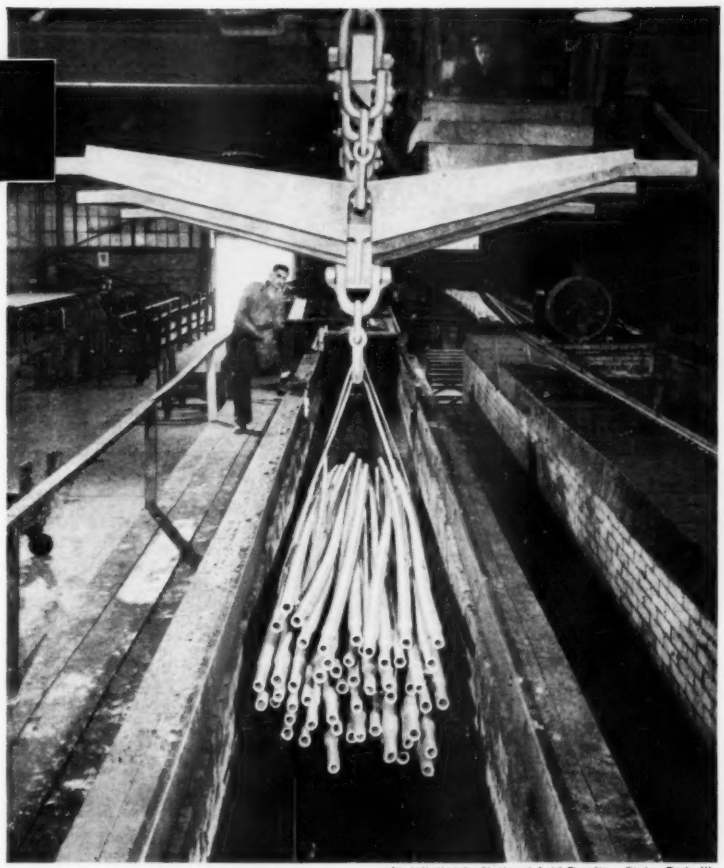
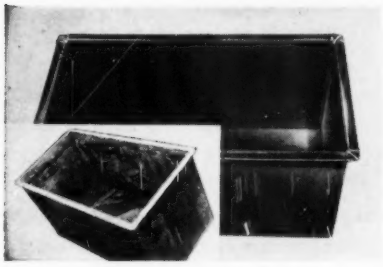
TANKS WIN EVERY BATTLE AGAINST CORROSION

Corrosion costs kept pyramiding at the Globe Steel Tubes Co., Milwaukee, Wisconsin. At temperatures of 80° to 90°, solutions of 20% nitric acid-hydrofluoric acid quickly ruined each type of costly lining tried in the 47-foot "pickling tank." After exhaustive tests of every available material, Globe engineers finally hit upon Vyflex L-10* made from Exon 900 series resins. This durable vinyl lining ended their corrosion problem. Installation was quick, simple and less costly than the linings previously used. Subsequent maintenance and replacement costs have been eliminated!

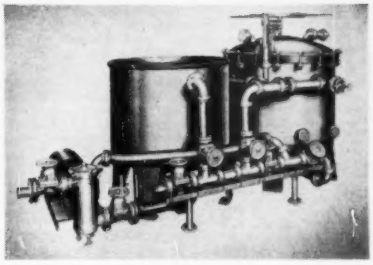


Installation by National Acid Proofing, Tinley Park, Ill.

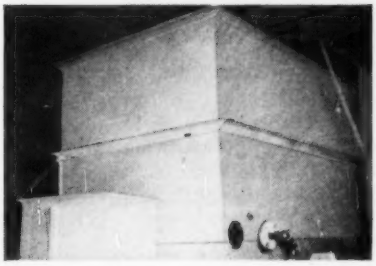


★ Corrosive chromic acid plating solutions destroyed in 6 months protective surface applied at the Tripp Plating Co., Buffalo. At 150° operating temperature, the acid has yet to affect tanks since they were lined with Vyflex L-10*.

Installation by Metal Cladding Inc., Buffalo, N. Y.



★ Standard 4200 G.P.H. chrome plating solution filter with Vyflex L-10* linings, made by Industrial Filter & Pump Mfg. Co., of Chicago. This leading filter manufacturer selected Vyflex L-10* linings as part of the original construction for this unit.



★ At Hoffmann-LaRoche Plant in Nutley, N. J., Vyflex L-10's* versatility permitted *on the spot* relining, without dismantling the huge 6' x 6' x 10' bleach tanks. Thus, installation costs and "down" time were greatly reduced.

Installation by La Favorite Linings, Inc., Hawthorne, N. J.

*Vyflex L-10, made from EXON 900 series resins is a product of Kaykor Industries, Inc. Division of Kaye-Tex Mfg. Corp. Yardville, New Jersey.

The simple fact is: you can stop corrosion. The tank liners shown above are based on only one of the many Exon resins developed by Firestone engineers to answer corrosion problems.

Exon polyvinyl chloride resins are the bases for a wide variety of corrosion controlling materials. In the form of lightweight structural rigids, linings or coatings, these versatile P.V.C. materials have a wide range of properties, providing the answer to your specific corrosion problem.

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Chemical Sales Division

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A DIVISION OF THE FIRESTONE TIRE & RUBBER CO.

NOTE: Firestone supplies the resin only, does not manufacture the end product.

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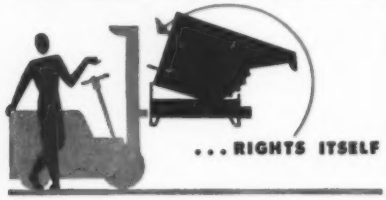

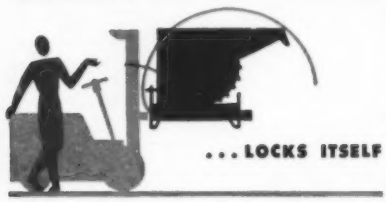

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1413 Woodland Ave., Detroit 11, Michigan

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DATA FILE

(Begins on page 150)

362 Tubular Conveyors—Form HC-541 contains about 44-pp of data on tubular conveyors for moving almost any flowable material. Shows basic types of these conveyors, tells what they're designed to do and how they are applied. Lists materials being handled to advantage with them, and discusses benefits. Gives engineering data on these units. Hapman Conveyors, Inc.

363 Engineered Conveyor Systems—Catalog 853, 32 pp, illustrates conveyor systems in use in a wide range of industries showing how they suit handling requirements involved. Roller, wheel, belt, chain, overhead trolley and elevating conveyors are included, also spirals, portable power conveyors, ball transfers and special equipment. Mathews Conveyor Co.

364 Continuous Power Conveyor — Sixteen-pp Catalog A-96 describes a packaged overhead conveyor for light duty applications. This complete basic "package" contains drive unit, take-up, oiler and other items essential for a 50-ft system. Describes power drive unit, track, power chain and other components and discusses lubrication and chain safeguards. Suggested layouts are diagrammed, and some installations of these conveyors are illustrated. Richards-Wilcox Mfg. Co.

365 Conveyor and Elevator Belting Tips—This 32-pp manual on installation, maintenance and care of conveyor and elevator belting, uses photos and drawings to show ways to improve belt service and lengthen belt life. Includes a discussion of belt design, covers, reinforcements and grades. Repair methods, splicing, and fastenings are also covered, and there's a table listing common conveyor belt maintenance problems with their cause and remedies. The B. F. Goodrich Co.

366 How to Pick a Truck—Catalog 54, 8 pp, features a step-by-step procedure for making the best fork truck choice for a particular handling job. Other sections in the booklet show at a glance complete specifications on each of company's trucks, and illustrates important construction and design features. The Baker-Raulang Co.

367 Preventive Maintenance for Trucks — This 6-pp article details requirements of a preventive maintenance program for industrial vehicles. Explaining the importance of good lubricants and correct lubrication, and enumerating the principal causes of equipment failure and breakdown, the booklet contains several suggested maintenance forms. Also emphasizes importance of record-keeping and employee attitude. The Elwell-Parker Electric Co.

368 Chain Hoists—Catalog 61, 32 pp, covers a line of chain hoists, telling how to select and use them. Provides an illustrated comparison chart of hoist types, a selector table and discussion of factors to be considered in buying a hoist. Multiple gear chain hoists, screw gear chain hoists, differential chain hoists described separately. Reading Crane & Hoist Corp.

369 Manual on Electric Hoists — Catalog H-46, 40 pp, covers monorail and stationary hoists and car pulleys. Explains fundamental types of grabs, methods of hanging I-beams, types of hoist suspension, controls. American Engineering Co.

370 Industrial Lifts—This booklet presents a wide range of elevating equipment designed to step up efficiency and cut handling costs. Covers dock lifts, crossover bridges, sidewalk elevators, service lift. The Wayne Pump Co.

371 Electric Hoist Manual—Catalog 215-B offers 38 pp of engineering, application and ordering information on company's Load Lifter electric hoists. Presents hoists with hand operated trolleys and with power travel, hoists with lug suspension, hook suspension and push-type trolleys, and with hand-geared trolleys, hoists for low head. Manning, Maxwell & Moore, Inc.

372 Versatile Palletizing System—A system of materials storage in which practically anything can be palletized is described in this 16-pp illustrated booklet. Provides check list of points to be considered in selecting a storage system and explains how manufacturer's equipment is designed for adaption to individual plant re-

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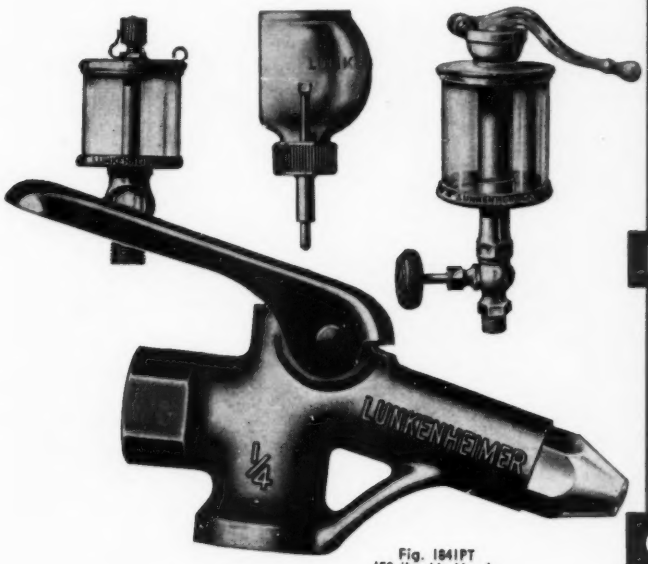
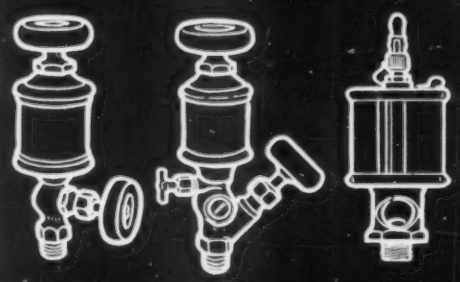


Fig. 1841PT
150 lb. Air Nozzle

AIR DEVICES



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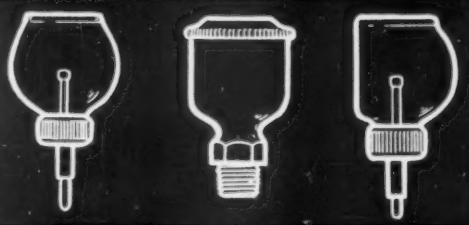

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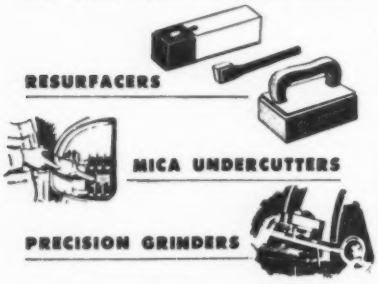

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DATA FILE

(Begins on page 150)

quirements. More than 25 installations are pictured. Tiering racks, deck, shelving and tiering hardware are shown. The Paltier Corp.

373 For Hopper Economy—"In Dollars and Sense" explains long run economy of company's self-dumping hoppers, showing how they operate and telling how they fit particular plant requirements. Illustrated with photos, gives dimensions, weight of a standard 1-yd model. Roura Iron Works.

374 Shovel and Loader—Described in 12-pp Bulletin 1932 is a hydraulic crown and hoist shovel and loader incorporating mechanical features usually associated with big shovels. Illustrates, gives specifications, application information on both pneumatic traction and crawler traction models. Dempster Bros., Inc.

375 Car Shaker—Time, labor, and money-saving advantages of company's car shaker for unloading hopper bottom cars are presented in this illustrated bulletin. Describes operation and three types of installation, and lists typical users. National Conveyor & Supply Co.

376 Shock Absorbing Casters — Twenty-pp Catalog FH-53 describes construction features of company's Floating-Hub casters, listing types and mountings now available. Load ratings for each type and size are provided. Stresses, by text and illustration, how these shock absorbing casters work, permit smooth travel over rough floors. The Bassick Co.

DUST CONTROL

377 Manual of Exhaust Hood Design—Bulletin 270-E1, 24 pp, features engineering data on dust control systems for the metal working industries. Illustrates and discusses the design of exhaust hoods for many operations in this field. Also, 61 photos of dust control installations show various methods of hooding dust source. American Air Filter Co., Inc.

378 Dust Control Blast Cleaning—Bulletin Cleaning 1210, 24 pp, fully illustrated, describes manufacturer's line of blast cleaning and dust control equipment, accessories. It is indexed according to equipment, type and purpose. Lists three methods of abrasive application. Pangborn Corp.

379 Improved Dust Filters—Sixteen-pp Bulletin 528-R gives information on continuous-automatic dust filters that can be furnished or unhoused for use on pressure or vacuum. Explains principle of cleaning the filter cloth with high pressure reverse jet air, and tells where these filters are being used. Provides comparative test data on these and other type filters; discusses industrial dust control service offered and diagrams some installations. Self-adjusting blow rings furnished with these filters are described in detail. The Day Co.

380 Dust Control—"Engineered Efficiency in Dust Collection and Recovery," 36 pp, discusses industrial dust recovery from standpoint of nuisance abatement, waste avoidance, hazard elimination. Shows effect of variation in particle size, distribution and specific gravity of dust on efficiency of the dust collecting system. Buell Engineering Co., Inc.

381 Dust and Fume Eliminators—Catalog 482, 12 pp, describes company's Centri-Merge dust and fume eliminators explaining advantages of the swirl action incorporated. Illustrations and dimensional drawings of units with capacities ranging from 400 cfm up to 5000 to 30,000 cfm. Schmieg Industries, Inc.

PACKINGS, GASKETS, SEALS

382 Packings and Gaskets—In this 40-pp belting and packing manual (NY-2697-P) are helpful charts plus information on the care, use and maintenance of rod and sheet packings and gaskets. A complete engineering section contains all necessary charts and tables for determining working specifications of packings. Also included are packing recommendation charts. New York Belting and Packing Co.

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"Today," says Kubsch, "The Terror of Tecolote is no more, and electrical maintenance problems are routine and normal, thanks to SAFE-T-SEAL, truly the best friend insulation ever had!"

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DATA FILE

(Begins on page 150)

383 **Buyer's Guide on Packing**—Twenty-pp Catalog PC-101 brings together all material on company's Palmetto packings and includes data on packing for liquid pistons on inside-packed piston pumps. Greene, Tweed & Co.

384 **Packings for Chemicals**—Dura Plastic Teflon packing for sealing applications in the handling of corrosive chemicals is introduced in Bulletin 461 M. D. Stresses heat resistance of the material, chemical inertness. Discusses construction details and lists packings for use with specific chemicals. Durametallic Corp.

385 **Metallic Packing** — This folder is devoted to company's elastic metallic packaging intended for frictionless operation by means of an oil seal. Photos and text tell how seal is constructed, used. A. W. Chesterton Co.

386 **Braided Packing**—Illustrated 8-pp Bulletin A-131 describes manufacturer's Lattice Braid rod and shaft packings. Points out construction features, and discusses available materials, sizes and forms. Also contains service reports from users, and includes service recommendations. The Garlock Packing Co.

VENTILATING AND AIR CONDITIONING

387 **Heating, Ventilating Units** — Catalog 1620, 40 pp, helps the plant engineer plan, specify and order the proper heating and ventilating units (air volumes from 1200 to 23,000 cfm; heating capacities from 100,000 to 2,500,000 Btu) for moving, heating or cooling of air. Five data sections cover descriptive performance, layout, engineering and service. For determining unit size, a step-by-step procedure is included. Hypothetical problems show proper use of performance data, curves and charts in selecting correct unit. Sturtevant Div., Westinghouse Electric Corp.

388 **How Conditioning Units Can Help**—The advantages of self-contained units in cooling, dehumidifying, cleaning are cited in 40-pp Catalog 1307. Explains installation, operation. Provides data on direct expansion and cold water cooling and on hot water and steam heating. Clarage Fan Co.

389 **Air Purification**—Industrial installations of Flexaust hose and Portovent duct for moving air, dust, fumes, gases, and materials are described in Bulletin 40. Illustrates many applications. The Flexaust Co.

390 **Air Conditioning Filters**—Bulletin 600, 8 pp, describes company's Staynew ventilation and air conditioning filters. Specifications, engineering, performance and installation data covering dry type panel filters, for the removal of air-borne impurities given. Dollinger Corp.

PLANT MAINTENANCE AND CONSTRUCTION

391 **Tar Base Coatings**—Now available is a collection of five bulletins on company's 100 series of cold applied tar base coatings. One bulletin gives general information on the full line and provides an application chart. The others give detailed specifications and application information on the various types. These include a coating for protection against severest corrosive conditions; a thin high gloss coating for general maintaining purposes; a coating for protection against generally severe corrosive conditions; and one for water tank interiors. Pittsburgh Coke & Chemical Co.

392 **Basic Roofing Information**—"What You Should Know About Your Roof" is a 40-pp, clearly illustrated booklet which tells what makes a roof fall, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of a good re-roofing job, also special features of company's roofing materials. Johns-Manville.

393 **Painting with Aluminum**—Again made available to plant engineers is Form AD-228, 322 pp, on the use of aluminum paint. Discusses advantages of aluminum paints, describes three

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Vertical Rotor Type DUST and FUME Eliminators
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An important new Schmieg development to wash hazardous dust and fumes from the air in a rotating torrent of water, combining the cyclonic principle of dust separation and positive high pressure water action.

Capacities from 500 to 50,000 C.F.M.

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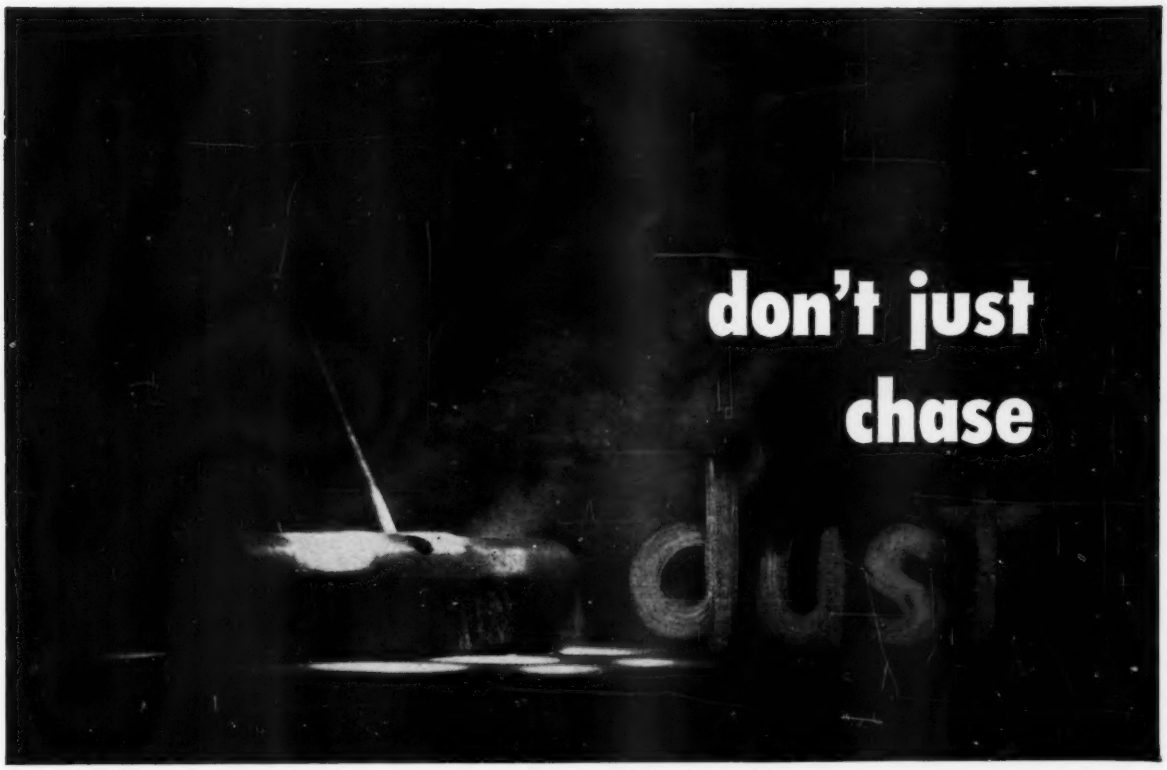

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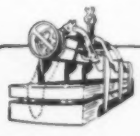

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DATA FILE

(Begins on page 150)

basic types for non-absorbent surfaces, for weather-exposed wood, and for heated surfaces and those not exposed to weather. Typical maintenance applications are covered in text and picture and practical suggestions for good results included. Use of aluminum paint on steel, galvanized metal, wood, masonry is detailed. Aluminum Company of America.

394 **Protection Against Rust**—This bulletin describes and gives application data for Z.R.C., a coating applied to iron and steel to provide a dried film protective coating of 93 to 95 per cent pure zinc. The Sealube Co.

395 **Hot-Dip Galvanizing**—How hot-dip galvanizing is prolonging life of industrial equipment is stressed in this 16-pp booklet. Photos showing galvanized equipment in use accompany brief text explaining how this process of covering iron and steel with a protective coating of zinc serves to prevent rust. The galvanizing procedure is explained and illlustrated. Coating comparison charts show how hot-dip galvanizing compares with other types of coatings as to rust resistance, dimension limits, shock resistance, initial and maintenance costs. American Hot-Dip Galvanizers Assn., Inc.

396 **Blower-Suction Cleaner** — Data on a portable combination blower suction cleaner for cleaning machinery motors, stock bins are offered. Describes models available, attachments for a wide range of cleaning jobs. Clements Mfg. Co.

397 **Combination Scrubber-Vacuum** — A single unit that applies the cleanser, scrubs, and picks up—all in one operation—is described in this illustrated literature. Gives full specifications for company's Model 213P for large area floors, and gives various methods of combination-machine-scrubbing suggested for hard, soft, oily floors. Also covers units for smaller and larger operations in gasoline-powered as well as electric models. Finnell System, Inc.

398 **For Fast Floor Repairing**—This illustrated bulletin covers Kwik-Roc, a fast and tough hardening material for repairing holes and cracks in concrete floors. Tells how to prepare surfaces for Kwik-Roc, how to mix, place, and store it. Includes service recommendations. A. C. Horn Co., Inc.

399 **Proper Care of Floors** — Filled with what-to-use and how-to-use-it information, this 32-pp booklet is a well written, practical text on floors. Presents floor preservation as a triple process involving cleaning, sealing and maintaining. Discusses various floor surfaces and their special problems. Gives helpful hints on floor maintenance and provides a handy chart covering preparation procedures and products for 12 common floor surfaces including cement, wood. West Disinfecting Co.

To order these catalogs circle item numbers on the handy Reader Service Cards provided on pages 145-146.

400 **For the Overhead Jobs**—Scaffolds designed to make overhead work safer and easier are described in 16-pp Form 10-852. Illustrates and discusses adjustability, large working platform, easy assembly, self-locking trusses and other advantages. Baker-Ross, Inc.

401 **Building Maintenance** — Handbook 7 offers 64 pp of information on floor surfacing, leak stoppers, external wall sealants, road-patching, roofing materials. Includes instruction for use. Flexrock Co.

402 **How to Use Presdwood**—This 32-pp booklet is filled with design and construction data on Presdwood. Although much of the material presented deals with use of Presdwood in homes, the book offers suggestions of value in industrial construction and remodeling. Sections of this practical handbook cover product

DATA FILE

(Begins on page 150)

data, working, application information for both interior and exterior use, and specifications. Includes instructions on proper conditioning, use of adhesives, types of bends finishing, interior joints, fastenings. A table shows properties, sizes available and intended applications. Masonite Corp.

403 **Lowdown on Suspended Ceilings**—Twelve-pp Bulletin A-129 is a "tell-all" brochure on a radiant panel heating, cooling, and acoustic control ceiling. Tells how company's three-way functional (suspended) ceiling is easy to lay out and install, competitive in cost. Diagrams and charts accompany text, which includes a brief of 12 advantages of this ceiling. Also provides departmentalization of components, performance characteristics, design and layout procedures, installation short cuts. Burgess-Manning Co.

404 **How to Glaze with Plexiglas**—Sixteen-pp Booklet PL-23 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems. Gives properties and behavior of this sheet. Plastic Dept., Rohm & Haas Co.

405 **All-Purpose Floor**—An economical floor, described as a hard mastic of superior strength, is the subject of this illustrated bulletin. Tells where this floor can be used, how to install it. Includes brief comparison data on this and other types of industrial floors, giving coverage cost figures. Permaflex Products Co.

406 **Industrial Doors**—This 16-pp 1954 door catalog furnishes listings and illustrations of manufacturer's line of doors, and provides helpful information on their use. Describes designs for turn-over, bi-fold and telescoping canopy doors, vertical lift, slide, and special purpose doors. International Steel Co.

407 **Air Tools, Paving Breakers**—These two bulletins describe company's latest models of paving breakers and air tools for plant construction and maintenance work. Bulletin PB1 gives features and specifications on heavy-duty, medium-weight and lightweight paving breakers, as well as tools for use with them. Bulletin ST-100 describes and gives specifications for clay spaders, trench diggers and backfill tampers. Gardner-Denver Co.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

408 **More Hammering Power**—This 20-pp book covers the uses of company's line of portable electric hammers and hammer tools. Contains many photos showing applications for the tools, plus charts giving relative penetrations of the hammers and hand operated tools with the same size drills. Cutaway and exploded views which graphically show the principle of operation and inner works are included. A cross-index chart lists the major applications in various fields of industry. The Black & Decker Mfg. Co.

409 **Metal Spraying Gun**—Company's Type 4E gun for high-speed spraying with all metals is designed for tool-post mounting or hand shows construction features of the gun which is designed for tool-postmounting or hand operation. Metallizing Engineering Co., Inc.

410 **Resistance Welding**—Featured in this 24-pp catalog are newly-designed tips and holders recently added to company's equipment. Full information is also given about other holders, tips, seam welder wheels and shafts and bushings, in manufacturer's line, as well as flash butt, barrel and other welding dies. Ampco Metal, Inc.

411 **Facts on Machine Anchoring**—Case histories on use of this company's Unisorb for machine installations are told and illustrated in this 24-pp booklet. They cover metalworking plants, food processing plants, printing plants, others. Also included are test data on vibration and the use of felt. The Felters Co.

This machine — moved 350 feet, yet out of production only five minutes — proves . . .

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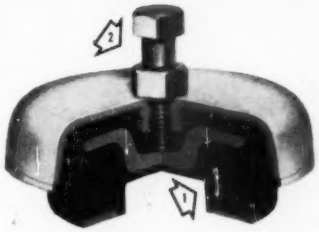

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DATA FILE

(Begins on page 150)

412 **Improved Machine Mounts**—This brochure describes advantages of company's leveling machine mounts. Tells how they enable installation and leveling of heavy machines without bolting or shims, afford increased plant mobility, reduce maintenance costs, and lessen noise. The Barry Corp.

413 **Improved Cutting Oils**—Cutting oils for keeping parts and tools up to 50 deg cooler and representing a new concept in non-emulsifying oils are described in two new technical bulletins. Form A-2724 describes Sunicut 11-S and 209-S, non-staining dual-purpose oils primarily for medium duty to heavy duty operation on automatic screw machines. Form A-2723 covers Sunicut 102-S and 110-S, which contain active-type sulfur and are effective for heavy-duty operations. Sun Oil Co.

414 **Ram Type Turret Lathes**—Catalog 101-A, 28 pp, explains and illustrates how this company's ram-type universal turret lathe is designed to provide more power transmission, more time saving, more width where it counts, more ease of operation, more accurate stops and other advantages. Large colored illustration shows construction features of the lathe. Bar and chucking equipment are pictured. General specifications for five models are included. Jones & Lamson Machine Co.

415 **Data for the Shop**—"Fluids and Facts for Metal Working," is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection,

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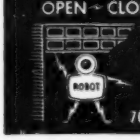

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Using Alcoa's new No. 2 EC* Aluminum Bus Bars, manufacturers of bus duct systems now can provide you with the most favorable combination of strength, light weight and conductivity at a significant saving in cost. Alcoa developed this new alloy to meet the demands of distribution bus and isolated phase construction for higher yield strength and better creep characteristics than could be obtained with EC metal. The result is yield strength of 25,000 psi for greater resistance to deformation by short-circuit current surges . . . a compressive creep rate substantially improved over EC No. 2 EC-T6 has a conductivity of 55 per cent IACS and No. 2 EC-T8 has a conductivity of 57 per cent IACS.

***PROPERTIES of No. 2 EC-T8**

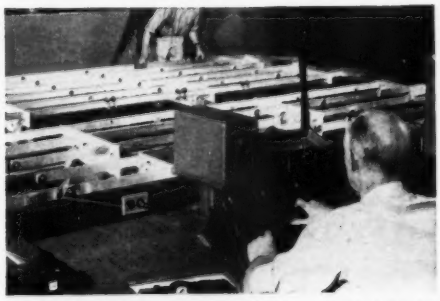
Tensile Strength, psi	Yield Strength, psi
Minimum—29,000	Minimum—25,000

Conductivity—57 per cent IACS

In bus duct systems, the light weight of No. 2 EC—almost 50 per cent under that of copper for equal electrical conductivity—permits the use of simpler and less expensive supporting structures, besides permitting appreciable savings on installation or relocation. Equally important, manufacturers using this new Alcoa Bus Conductor can save you money on your initial investment. Ask your manufacturer for further information.

Wherever your production requirements demand an efficient, flexible electrical distribution system, specify bus duct with Alcoa Aluminum Bus Bar. This dependable product is the result of 56 years of experience, beginning with the world's first aluminum bus bar installation. Write Alcoa to get the names of manufacturers offering bus duct with Alcoa Aluminum Bus Bar. ALUMINUM COMPANY OF AMERICA, 2089-M Alcoa Building, Pittsburgh 19, Pennsylvania.

Tensile properties of Alcoa's No. 2 EC Alloy for bus bars are checked on this Baldwin-Southwark tension-testing machine, periodically calibrated to assure precision.



A precision potentiometer records the voltage drop on test sections of Alcoa Aluminum Bus Bar in the Massena, N. Y., laboratories, world's largest facility for aluminum conductor research.

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(Begins on page 150)

preparation and use of soluble oils and paste compounds, and prevention of dermatitis. A section on metal working facts gives conversion tables, steel numbering systems, machinability ratings of metals, drill grinding charts, twist drill sizes and other data. Booklet also includes product data on industrial oils, machine tool lubricants, greases, quenching and tempering oils. Standard Oil Co. (Ind.)

416 **Hydraulic Pullers**—Industrial maintenance problems involving removal and installation of gears, bearings, pulleys sheaves, pinion shafts, couplings and tubes are treated in Power-Twin Bulletin HY-1953, 24 pp. Covers use and application of pullers, attachments and adaptors for 17½-, 30- and 50-ton hydraulic rams. Also shows puller sets for use with company's center-hole rams. Owatonna Tool Co.

LUBRICANTS, LUBRICATION

417 **Bearing Lubrication**—Vol. XL, No. 10 of this company's Lubrication magazine provides an excellent 12-pp article on industrial bearing lubrication. Illustrated with photos and drawings, text covers such subjects as bearing design; bearing surfaces; bearing overhaul; aspects of lubrication, including factors involved in choice of turbine oils and diesel lubricants, and the effects of moisture; and the life expectancy of bearing lubricants. The special requirements of porous bearings are also discussed. The Texas Co.

418 **Proper Lubrication**—Presenting proper lubrication as the life blood of all machinery, 36-pp Lubriplate Data Book 54-1 is a helpful treatise on modern lubrication practice. Gives product data on both oil type lubricants and greases and discusses choice of lubricants for use in applications involving heavy loads, high speeds, extreme temperatures, water conditions and other metal working. Provides tables of specific recommendations for various classes of equipment used in chemical processing, metalworking, other industries. Lubriplate Div., Fiske Brothers Refining Co.

419 **Lubricant Recommendations**—Featured in this 20-pp booklet are lubricant recommendation charts covering a wide range of lubricating applications and showing which of company's products is best suited for each. Also provided are data on metal working lubricants and cable pulling compounds. Includes product listing. Adam Cook's Sons, Inc.

420 **Automatic Lubrication** — Sixteen-pp Catalog L-52 describes force feed lubricators for all types of machinery. Illustrated, gives full design and construction details on company's open and enclosed type lubricators, available in capacities from 2 to 32 pints with 1 to 24 feeds per unit. Hills-McCanna Co.

421 **Force Feed Lubricators**—12-pp Catalog 25 G describes and pictures company's new Model 25 lubricator, a popular priced, general-purpose unit adaptable to many applications. Lists machines for which it provides economical, automatic lubrication. Discusses drive arrangements. Manzel Div., Frontier Industries, Inc.

422 **"Dag" Dispersions at Work** — How "dag" colloidal dispersions serve industry is told in 12-pp illustrated Catalog 460. A table lists 40 basic dispersions of graphite, molybdenum disulfide, vermiculite, and zinc oxide in various carriers. Comparative particle size and consistency of each dispersion is given, as well as typical uses. Acheson Colloids Co.

423 **Centralized Lubrication** — Featuring selection charts covering low and high pressure fluid lubrication systems for a wide range of industries and providing an explanation of operating principles of various types of systems, 24-pp Catalog 80 covers company's lubricant application equipment. Describes, pictures lubricant pumps. Lincoln Engineering Co.

424 **Multi-Purpose Grease**—This bulletin describes Gargoyle Grease BRB No. 1, intended to provide correct lubrication for practically all

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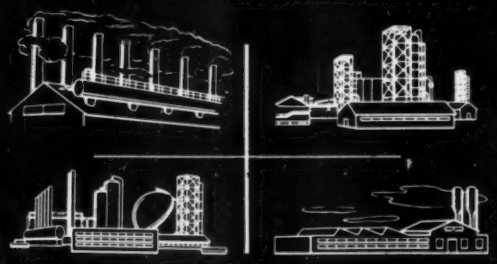

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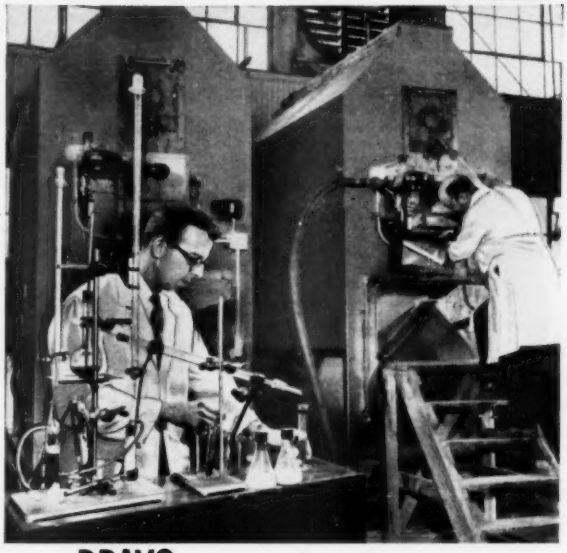

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(Begins on page 150)

normally loaded anti-friction and plain bearings. Tells how it resists leakage, protects against rust and corrosion. Socony-Vacuum Oil Co.

INSTRUMENTS, CONTROLS

425 **Control Centers**—Advantages of control centers and their versatility are discussed in this 28-pp booklet. Illustrated with photos and full-colored drawing, booklet shows 10 typical installations of control centers and explains how this equipment can lower costs. Design and construction features are explained, and three basic NEMA types of construction described. Electrical and mechanical construction details are shown, typical specifications provided and handy space requirement tables included. The Clark Controller Co.

426 **Flow Meters**—Catalog 2320, 58 pp, fully illustrated, describes all types of manufacturer's flow meters, including indicating, recording, integrating and controlling instruments of evenly graduated and square root types, as well as area meters and differential converters. Includes tables on flow approximations, installation information, factors necessary to determine if fluid to be measured can be properly handled. Industrial Div., Minneapolis-Honeywell Regulator Co.

427 **For Liquids Worth Storing**—Bulletin 6405 offers an illustrated discussion of company's self-contained gages for liquid level applications, covering both direct- and remote-reading types, also a dial type hydrostatic gage. Stresses value of measuring stored liquids. Liquidometer Corp.

428 **For Efficient Air Control**—Sectional Catalog 20 contains a working file of data on manufacturer's air control products. In it, sections are devoted to couplers, blowguns, hose, and fittings; air ejection sets; pneumatic press controls; air cylinders and operating valves; four-way valves; and miscellaneous air control equipment. Includes current price list. A. Schrader's Son.

429 **Orifice Meters**—Bulletin 1050 Rev. 1, 28 pp, shows how manufacturer's orifice meters are made, how they operate. Tables give capacity data, and there are descriptions of manifold arrangements and differential ranges, along with illustrations of various parts. Sketches show how meters are used. Rockwell Mfg. Co.

430 **Industrial Thermometers**—Fourteen-pp Catalog 101 describes and pictures company's Gotham line of thermometers, including the Multi-Angle which can be rotated and tilted to practically any position. Includes temperature equivalent table. U. S. Gauge Div., American Machine and Metals, Inc.

431 **Handbook on Automatic Controls**—Catalog 700 provides 45 pp of ordering and application data on automatic controls with mercury contact switches. Covers control equipment for temperature pressure-low water, liquid level bottles; transformer-relays, valves. The Mercoid Corp.

432 **Ideas on Push-Pull Controls**—Included in this "Idea File" are answers to a plant engineer's questions on the use of push-pull controls. A general information booklet discusses remote control applications, explains construction and operation of company's Tru-Lay controls. Separate bulletins are devoted to standard assemblies, bracket-type head controls, micro controls and hand-operated controls. Automotive and Aircraft Div., American Chain & Cable Co., Inc.

HEATING, HEATERS

433 **Forced Air Space Heaters**—Illustrated Bulletin 523-B, 12 pp, is devoted to a line of forced air heaters for comfort heating, year-round ventilating, tempering make-up air, process drying and heat curing. Explains design efficiency, construction details, operating principles and flexibility of application. Advantages of the heater are detailed. Dravo Corp.

434 **Buying a Portable Heater?**—Stressing safety factors involved, this 40-pp booklet, "Guide to the Selection and Use of Portable Space Heaters," analyzes temporary heating equipment from standpoints of personnel well-being, property protection and fire and accident prevention. Classifies basic types of direct, indirect-fired heating devices. Herman Nelson Div., American Air Filter Co., Inc.

435 **Plumbing, Heating Supplies**—Edition G is the current edition of this company's 118-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated; gives sizes, intended uses and ordering data. J. A. Sexauer Mfg. Co., Inc.

436 **Unit Heaters**—Bulletin 7517, 48 pp, presents full information on latest design of this company's Venturafin unit heaters for steam or hot water applications. Gives features of construction, general engineering data, capacity tables. Fully illustrated with photos of horizontal and vertical models, dimensional drawings and piping diagrams, booklet includes tips on the use and selection of unit heaters. American Blower Corp.

437 **What Unit Heaters Can Do**—Featuring many photos showing how unit heaters are being used to provide heating comfort, cut fuel costs, provide economical air circulation, 8-pp Bulletin 149-A discusses advantages of these heaters and gives performance data. Modine Mfg. Co.

438 **Engineering Data for Heating Systems**—A great deal of helpful information on heating systems is presented in Engineering Data Manual 2695, 28 pp. Detailed illustrated information pertaining to heating problems is given. Besides covering heating terminology, there are sections on steam data, water properties, piping data, weights and measures and pipe dimensions. C. A. Dunham Co.

439 **Steam Heating Systems**—Five major types of steam heating systems, with and without control, and a full line of valves, traps and steam power specialties are described in Bulletin 110, a 20-pp condensed catalog.

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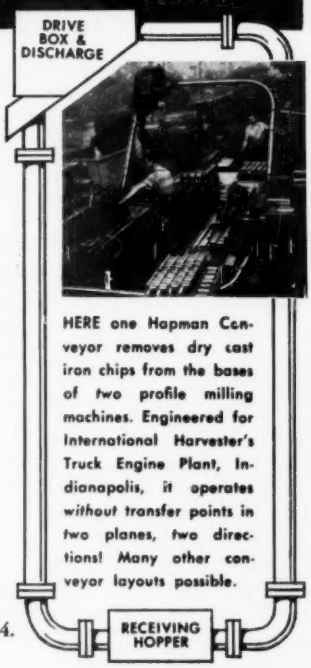
for low-cost handling of bulk flowable materials — wet or dry

"Shovel labor" costs *plenty* — so do safety hazards and confusion caused by heavy aisle traffic. But there's a better way — the *Hapman Way!*

By handling innumerable bulk materials with Hapman Tubular Conveyors, you can slash these costs — and increase safety and efficiency! Can you handle metal chips from machine tools? *Yes!* Flour? *Yes!* Abrasive or corrosive chemicals? *Yes!*

Get details NOW — write Hapman, describing your problem. Ask for Bulletin PE-1254.



HERE one Hapman Conveyor removes dry cast iron chips from the bases of two profile milling machines. Engineered for International Harvester's Truck Engine Plant, Indianapolis, it operates without transfer points in two planes, two directions! Many other conveyor layouts possible.

Hapman CONVEYORS, INC.
DIVISION HAPMAN-DUTTON COMPANY
KALAMAZOO MICHIGAN

For more facts circle 634 on Reply Card

DATA FILE

(Begins on page 150)

Features company's Selectotherm system—automatically controlled high vacuum steam heating system that adjusts its heat output and fuel consumption to outdoor temperature conditions. Also describes a system for installations that are zoned, that use steam for purposes other than heating, and that use steam supplied by central station. Illinois Engineering Co., Div., American Air Fliter Co., Inc.

440 **Electric Heaters**—Bulletin E-1, 8 pp, describes electric unit heaters and heater sections for general industrial heating as well as for specialized use in heating corners of factories, warehouses. Illustrates overhead downward discharge heaters with revolving and stationary discharge outlets, and a heater with horizontal discharge. L. J. Wing Mfg. Co.

OVENS, DRYERS

441 **Industrial Ovens** — Engineering, manufacturing and installation of processing ovens are described in Bulletin D-53-20, 16 pp. Covers oven types, application to industry, source of heat, selection of heaters, control of heat, distribution of heat. Photos show typical oven installations, and a complete modern finishing process is presented. Newcomb-Detroit Co.

442 **Industrial Ovenes** — Thirteen types of company's Convectioneered ovens, which apply principles of forced convection heating to various industrial processes, are illustrated and described in 12-pp Bulletin 200. These ovens serve foundries, metal finishers, plastics producers. The W. W. Sly Mfg. Co.

443 **ABC's of Dryness**—Eight-pp Bulletin 16.0.081 presents packaged dehydration units for efficient drying of air or other gases. Tells what these dryers can do, what they will remove dryness from, and where they are recommended for use. Explains drying operation; discusses absorbents and equipment utilized, giving construction details and sizes offered. Typical arrangements for both full-stream and split-stream reactivation included. Equipment Div., J. F. Pritchard & Co.

SAFETY, SANITATION

444 **Fire Extinguishers**—How to Extinguish a fire in 11 sec by use of the Fyr-Fyter instant extinguisher with "loaded stream" chemical liquid, "Karbaloy," is pictured in Bulletin F-1158. Lists advantages of 500 lb stainless steel model. The Fyr-Fyter Co.

445 **Dry Chemical Extinguishers** — New quick-acting fire extinguishers of the dry chemical type in 20 and 30 lb sizes are covered in Form C-104. C-O-TWO Fire Equipment Co.

The two Reader Service Cards on pages 145-146 are easy to use and need no postage. Just circle the item number of catalogs wanted.

446 **Advice on Washrooms**—Information on company's washroom advisory service is available to plant engineers. Tells of plans and specific suggestions for improving washrooms included in this service. Scott Paper Co.

447 **Hand Dryer**—Form 1123 describes and pictures a high-speed hand and face dryer for use in industrial washrooms. Tells special features. The Chicago Hardware Foundry Co.

WATER TREATING

448 **Condensate Line Corrosion**—Attributing condensate line corrosion chiefly to carbon dioxide in the steam and water, Technical Paper 127 discusses various methods of minimizing boiler feedwater alkalinity, especiallly the use of filming amines. Reports field results under various conditions. W. H. & L. D. Betz.

449 **Industrial Water Service** — How this company is prepared to solve problems related to procurement, treatment, use and disposal of industrial water is told in this 10-pp booklet. Tells services and facilities available; discusses measures taken to solve some representative water problems. Hall Laboratories, Inc.

450 **Information on Ion Exchangers**—Here are three booklets on ion exchangers: Nalcite HCR, a styrene type cation exchanger; Nalcite SAR, a basic anion type; and Super Nalcolite, a synthetic gel type zeolite for cation exchange. Tables and graphs explain performance of these water treating resins under various operating conditions. Physical characteristics, exchange capacities, regeneration techniques given. National Aluminate Corp.

WIRE ROPE, SLINGS

451 **To Keep Wire Rope at Work**—Form 3547 is an 82-pp handbook titled: "Here's How to Keep Your Wire Rope Working," and filled with practical tips on care and use of wire rope. Tells how wire rope is constructed, what types are suited to various jobs, how to install it. Covers such subjects as abrasion, lubrication, avoiding kinks, alignment of sheaves, winding on drums, bending fatigue, wire breaks, when to discard a wire rope. Wire Rope Div., American Chain & Cable Co., Inc.

452 **Slings for Industry**—Form 5308 is a compact reference bulletin packed full of sling data. Lists slings of approximate breaking strengths of 1000 lb to 243.4 tons, along with their safe loads. Macwhyte Co.

453 **Sling Handbook and Riggers Manual** —In the sling handbook section of this 48-pp book, 11 sling types are illustrated and their dimensions, weights and safe working loads given. Illustrations of sling uses accompany factual data. Also pictured and detailed are

APCO Packaged CONDENSATION RETURN UNITS
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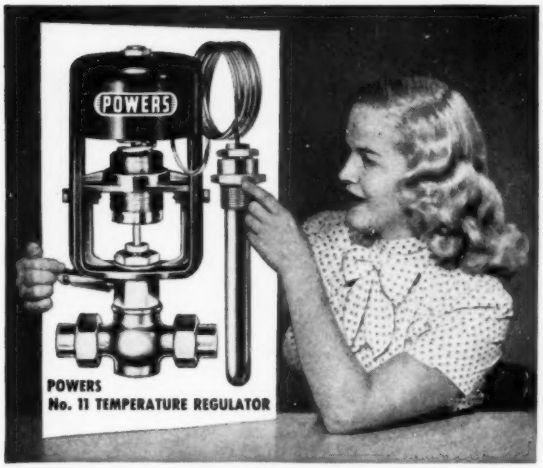

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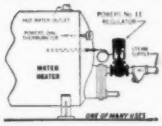
due to OVER-heated water



Install Powers No. 11 Self-operated temperature regulators. They prevent OVER-heated water, often pay back their cost 3 to 6 times a year and give years of reliable service. They are simple to install, dependable, economical. Write for Bulletin 329, prices and full information about this quality regulator. (c16)

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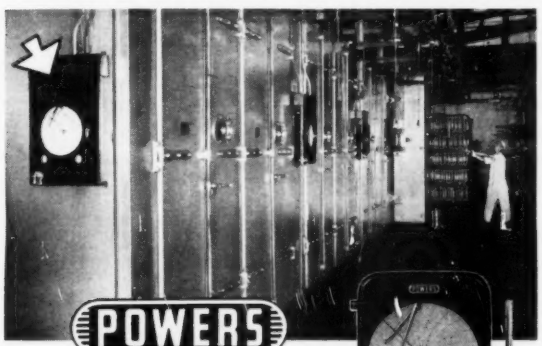

AIR CONDITIONING CONTROL SYSTEM FOR PROCESSES—Temperature, humidity and air pressure in the modern smoke houses above are automatically held at the right point with unfailing accuracy by Powers automatic control. Losses from shrinkage or inferior quality products are eliminated and uniform flavor, color and texture of product are insured by accuracy of Powers control. Your temperature control problem may be different, but like many others for which Powers has supplied the right control. Why not call our nearest office now or write us direct for Bulletin 370. (c13)

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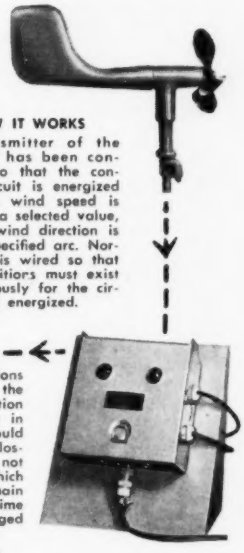
AIR POLLUTION

How To Make Your Smoke Stack Act Taller Than It Is!

New wind operated, automatic controller energizes forced draft or heat systems under unfavorable meteorological conditions . . . thereby increasing "effective stack height." It's called The Bendix-Friez Windtrol*.

For example, the plant that we're talking about has a relatively low stack. The release of fly ash with its stack effluent results in many complaints under certain meteorological conditions. How can this be corrected . . . without great expense? Let's see what the principles of stack meteorology can show us.

By checking wind speed and direction . . . unfavorable quadrant can be discovered. First, you install at near stack height the Bendix Windtrol Transmitter. This detects the wind speed and direction. The unfavorable quadrant is established for air pollution and the controller (located indoors on any convenient wall) is wired accordingly. The controller is then connected to a forced draft fan, a booster blower or a stack oil burner.



HOW IT WORKS

The transmitter of the Windtrol has been constructed so that the controller circuit is energized when the wind speed is less than a selected value, and the wind direction is from a specified arc. Normally, it is wired so that both conditions must exist simultaneously for the circuit to be energized.

Observations indicate that many situations will arise because of the gustiness of the wind in which either or both, the direction and speed will oscillate rather rapidly in the vicinity of the selected limits. This could result in intermittent and short period closures of the controlling circuit, were it not for a built-in time delay device which causes the actuating power relay to remain open or closed for a given length of time after the direction or speed has changed from the required limits.

For further information, write today.

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DATA FILE

(Begins on page 150)

sling fittings. Information on care of slings, data on braided wire fabric and directions on splicing braided wire sling fabric included. The riggers manual gives detailed instruction on splicing, and includes data on efficiencies of wire rope attachments. Union Wire Rope Co.

HOSE AND TUBING

454 **Hose and Tubing**—Catalog CC-400 is a 16-pp illustrated quick-reference booklet on manufacturer's flexible metal hose and tubing. These products are made in two basic types: seamless and strip wound. Catalog shows wide range of available alloys and sizes, suggested uses; gives engineering data. The American Brass Co.

455 **Metal Hose Manual**—Technical Data Book U-111, 24 pp, includes information on application, temperature ranges of various types of metal and wire braided hose, dimensions, couplings, assemblies. Type of hose manufactured by this company are illustrated and described, including seamless all-metal flexible pressure hose; interlocked suction, blower and conveyor hose; square locked conduits and flexible spout tubing; double wire-braided hose for high pressure. Universal Metal Hose Co.

FANS, BLOWERS

456 **Fan Engineering Data**—Bulletin A-108, 16 pp, gives fan laws and formulas, terminology and recommended velocities for exhaust hoods. Includes air pressure conversion table, charts on dust resistance, entrance losses and rectangular equivalents of round ducts. Discusses fan installation, maintenance and lubrication, also noise. Hartzell Propeller Fan Co.

457 **Industrial Fans**—Propellair Bulletin 650, 12 pp, contains dimensions, application, and performance data of Tubeaxial and Stackbooster fans. Gives information on cooling and drying problems, system and open surface tank ventilation. Robbins & Myers, Inc.

458 **Induced Draft Fans**—Eight-pp Bulletin DB-32-53 provides engineering information on manufacturer's Bifurcator fans for providing controlled draft for boilers and furnaces. Gives construction details, sizes. Illustrated with photos, diagrams of suggested methods for installation. DeBothezat Fans Div., American Machine and Metals, Inc.

459 **Industrial Exhaust Fan**—Housing design, wheel construction and standard arrangements of manufacturer's Type EX exhausters are discussed in illustrated Bulletin C-46EX. Provides capacity tables, dimensions and photos of standard and special fan. Bayley Blower Co.

OTHER EQUIPMENT

460 **Continuous-Cast Bronzes**—This 12-pp bulletin describes, illustrates Asarco continuous-cast bronze products including copper alloy rods, valve guides, air brakes, packaging machinery. Tables include typical physical properties of foundry alloy cast by three methods; impact tests revealing high safety factor for heavy-duty parts. Lists specifications, sizes, weights on rods, bars. American Smelting and Refining Co.

461 **Steel Reservoirs, Standpipes**—This 24-pp booklet pictures installation of reservoirs of 50,000- to 10,000,000-gal capacity, having cone, umbrella or ellipsoidal roofs and ornamental structures with special architectural features. Provides table of standard capacities, information on foundations, use of suction tanks for fire protection. Chicago Bridge & Iron Co.

462 **Handbook on Fluid Circuits**—Now available to plant engineers is the second printing of "The Circuit Rider." This 32-pp pocket-size manual presents a down-to-earth discussion, together with drawings, of basic designs in fluid power circuits and points out the wide range of operations possible through the application of different types of such circuits. The Logansport Machine Co., Inc.

463 **Socket Head Fasteners**—Advantages of company's screw products are described in this folder. Included are socket head cap screws, shoulder screws, flat head socket cap screws and button head socket screws. Also described are socket screw keys, square head set screws, pressure plug and dowel set screws, pressure plug. Standard Pressed Steel Co.

464 **Industrial Leathers**—These illustrated data sheets cover company's leather products and include specifications on various types of leather belting. Also gives data on leather packings for hydraulic and pneumatic equipment. J. E. Rhoads & Sons.

465 **Industrial Non-Metallics**—Polypenco Nylon, Teflon, filled nylons, and other non-metallics are the subjects of this bulletin. Illustrated with photos, gives characteristics and advantages of these materials, data on rod, strip, tubing and slab available, parts that can be produced. Polymer Corp. of Pennsylvania.

466 **Neoprene Design Book**—This illustrated bulletin discusses the properties of Neoprene, showing how they are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures, flame and chemical resistance. Rubber Chemicals Div., E. I. du Pont de Nemours & Co.

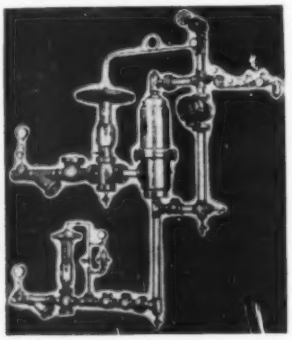
467 **Preheating Combustion Air**—This well-illustrated 36-pp booklet explains fuel savings and increased performance made possible by using waste heat in flue gases to preheat incoming combustion air. Also covers increased boiler output, ability to use lower grade fuels, other advantages. Air Preheater Corp.

468 **Industrial Equipment**—Bulletin WP-1099-B61, 16 pp, describes manufacturer's industrial equipment including centrifugal refrigeration systems, condensers and coolers, steam power plant equipment, water conditioning deaerators and rotary pumps. Gives features, types, sizes, capacities, and describes their application. Worthington Corp.

INSIST ON

Pick

INSTANTANEOUS HOT WATER HEATERS



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Installation Is Inexpensive. Only ordinary pipe connections are required.

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Write for booklet on how Pick Heaters cut costs of hot water. No Obligation.

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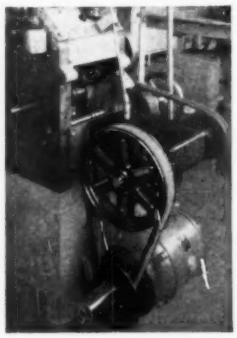
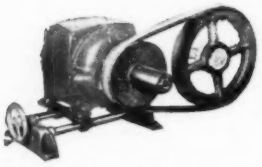
increase machine performance with LOVEJOY Variable Speed PULLEYS





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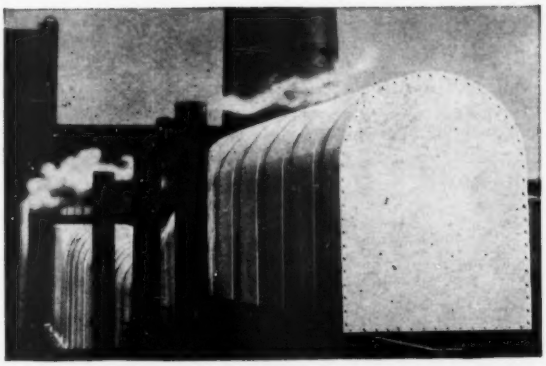

Boiler breeching, Southland Paper Mills, Inc., Lufkin, Texas.
Aluminum Paint: High Heat Aluminum, Napko Paint & Varnish, Houston, Texas.

One coat of ALUMINUM PAINT protects exposed boiler breeching for more than 20 months!

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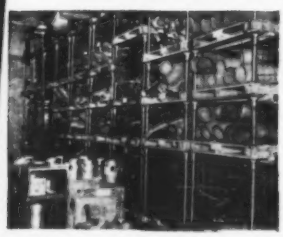

increases storage space up to **75%** and more—

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ASK US: PALTIER studies your storage problem—engineers and designs a system for your specific needs.

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THE PALTIER CORP.
1717 Kentucky St., Michigan City, Ind.

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DATA FILE

(Begins on page 150)

469 Heat Exchangers — A description of stock and specially engineered fixed tube bundle heat exchangers is given in newly revised 12-pp Catalog 1254. Contains application photos covering a wide range of industries and includes materials and construction features, dimensions drawings and tables. Approximately 4-pp are devoted to a guide to heat exchanger selection. This data includes tables and formulas for selecting exchangers involving most common cases of water-to-water and water-to-oil heat transfer. Young Radiator Co.

470 Chemical and Processing Equipment — Blending, processing, and heat exchange equipment for chemical and processing industries is described in 12-pp Bulletin 13. Provides photos and specifications on a variety of sizes and adaptations to company's three basic types of blenders. Describes process equipment in ranges from small 5 to 15 gal packaged pilot plants and autoclaves to kettles and reactors of 1000 gal capacity. Patterson-Kelley Co.

471 Rigid Plastic Material — The advantages, uses and available forms of Bolatron 6200 are presented in this catalog, about 14 pp. Gives dimensional data, tolerances, weights for sheet, bar stock, pipe, fittings and valves made of this unplasticized polyvinyl chloride. Includes thermal, electrical and mechanical properties, also detailed information on chemical resistance. H. N. Hartwell & Son, Inc.

472 Large Capacity Condenser —Bulletin 123 describes the 400-ton capacity Aeropass condenser and fluid cooler. Explains and illustrates operating principles of the unit. Lists benefits for large liquid cooling and condensing applications. Niagara Blower Co.

473 Magnetic Selection Guide —Twelve-pp illustrated Catalog of C-5000-B, describing manufacturer's entire line of magnetic separators and lighting magnets, serves as handy guide to the selection of magnets. Dings Magnetic Separator Co.

474 Toggle Switch — Catalog 73a, 12 pp, covers 19 precision snap-action toggle assemblies and more than 90 AN and JAN approved designs, including assemblies that will control from 1 to 24 separate electrical circuits. Contains dimensions, operating characteristics, electrical ratings, contact arrangments on each switch, and an illustration of one representative switch from each group of switches. Gives general information on each "family" of switches, which are designed for low voltage d-c applications. Micro Switch Div., Minneapolis-Honeywell Regulator Co.

475 To Keep Out Moisture— Vents designed for easy installation on any roof to keep out wet, foul air are described in this literature. Muckle Mfg. Co.

476 Door Operators—This catalog covers electronic operators for opening, closing and locking doors and gates for a wide range of industrial and special applications, friction drive or chain drive. Robot Appliances, Inc.

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Repair broken factory floors without the usual traffic tie-up. Simply shovel INSTANT-USE into hole or rut—tamp smooth—truck over! No waiting! INSTANT-USE bonds tight to old concrete—right up to a feather edge. It's tough. Wears like iron. Won't crack or crumble. Install complete overlay where floors are badly chewed up. Used indoors or out. Immediate shipment.

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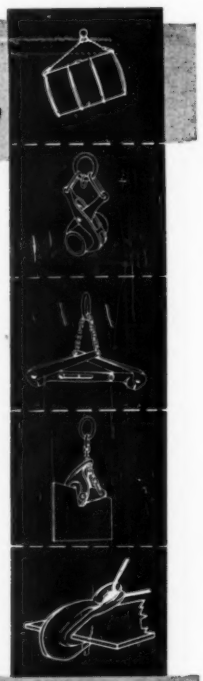

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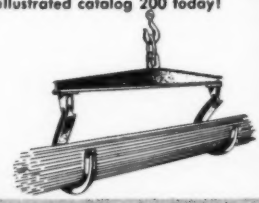

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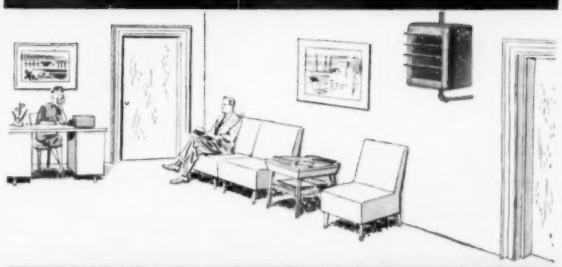

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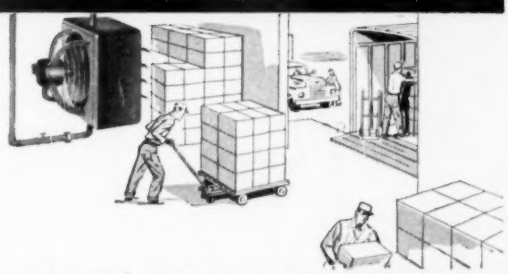

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(Begins on page 150)

477 Shop-Assembled Boiler — Sixteen-pp Bulletin G-76 completely describes and illustrates company's Type FM water-tube integral-furnace boiler, made in standard sizes from 2900 to 28,000 lb of steam per hr, pressure to 250 psi. Capacities, dimensions given. The Babcock & Wilcox Co.

478 Mechanical Drive Turbine —Bulletin H-22, 16 pp, shows design features, proper control of manufacturer's Type YR mechanical drive turbine. Lists modifications for special applications, dimensions. Elliott Co.

479 Improved Hose Coupling— A quick connect-disconnect hose coupling for water, oil, steam, gas and chemical lines is described in this 16-pp bulletin. Describes the coupling's construction and explains how it provides a sealing action which makes the coupling tighter as internal pressure increases, and a full swiveling action that prevents hose twisting and kinking. Bulletin also describes single- and double-check valve modifications which permit disconnecting lines without shutting down pumps. Titeflex, Inc.

480 Handbook on Crushing — Not an ordering catalog, this 32-pp manual is aimed at a better understanding of mechanical crushing in order to promote better results from crushing operations. Well illustrated, booklet stresses importance of suiting the crusher to the job. Four means of mechanical reduction — impact, attrition, shear and pressure — are discussed. Also included is information on power requirements of crushing and selection factors. Pennsylvania Crusher Co.

481 Finishing Systems — Illustrated Catalog A-653, 12 pp, describes complete finishing systems for porcelain and synthetic enamel, lacquer, paint, and other finishing. Also covers a variety of other industrial equipment including ovens, dust collectors and fog filters. The R. C. Mahon Co.

482 Precision Blending System —This 12 pp folder describes the construction operation, flexibility and wide application of a system for accurately blending, compounding or mixing two or more liquids in increments as low as 1/20 per cent. Stresses long-run economy of system. Bowser, Inc.

483 Coal Crushers — Catalog 784-B, 44 pp, provides selection data on coal crushers for a wide range of capacity and product requirements. Fully illustrated with photos and drawings, presents single roll types, Fiextooth and rotary ring crushers, heavy-duty slugger type crusher, double roll crushers, swing hammer pulverizers and others. Catalog includes dimensions and capacities; shows eight typical crusher installations. The Jeffrey Mfg. Co.

484 Reference File of Plastics, Resins—The 12-pp 1954 condensed reference file of Bakelite and Vinylite plastics and resins provides descriptive and application information. Covers molding and extrusion materials, wire and cable coverings, bonding resins, protective coating resins, laminating plastics, rigid sheets, flexible film and sheeting, calendering materials. Bakelite Co., Div., Union Carbide and Carbon Corp.

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NEW BOOKS for the plant engineer's library

Atomic Energy

APPLIED ATOMIC ENERGY by K. Fearnside, E. W. Jones and E. N. Shaw. Size 7½ by 5 in.; 156 pp; cloth bound. Published by the Philosophical Library, 15 East 40th Street, New York, N. Y. Price $4.75.

THE INTRODUCTORY chapter of this timely and useful publication offers basic information on nuclear physics, touching upon nuclear unstability. In the ensuing material, attention is given to the prospects of power generation and problems of international control.

A chapter on techniques briefly covers the detection of radiation and considers the use of the ionization chamber, proportional counters and the Geiger counter. A sizeable portion of this book is given to a number of the uses of radioisotopes in research, biology, agriculture and industry.

On Pallets

PALLETS AND PALLETIZATION. Size 11 by 8½ in.; 18 pp; illustrated; paper bound. Published by National Wooden Pallet Manufacturers Association, Barr Building, Washington 6, D. C. Price $1.00.

PALLET construction and usage are some of the items treated by this handbook which has been prepared for the segment in industry concerned with modern handling methods in manufacturing, warehousing, and transportation operations. The publication is printed in color.

The booklet contains information on specifications, selection and purchase of pallets, unit load patterns, maintenance, and inspection of pallets. A glossary of terms and a list of government specifications are included for reference purposes.

Plant Engineer's Aid

PLANT ENGINEER'S PROBLEM SOLVER by Louis J. Murphy. Size 9 by 6 in.; illustrated; 355 pp; cloth bound. Published by Conover-Mast Publications, Inc., 205 East 42nd St., New York 17, N. Y. Price $6.00.

THIS BOOK contains many charts designed to aid engineers with their problems. A time saving feature of these charts is their simplicity. Most of them require one straight line to get a solution to a problem. Accompanying examples and solutions explain the use of various charts.

Many aspects of plant operation are considered in this book. Among the items of interest to plant engineers that are given attention are the following: pipe and piping systems; pumps and pumping equipment; compressed air; mechanical power transmission; industrial waste treatment; oil and gas calculations; and plant maintenance.

Specifically the charts provide quick answers to problems dealing with such details as cost of pumping water, leather belt power transmissions, waste systems sizing, estimation of paint requirements, temperature for shrink fits, cutting speeds, amount of steam needed to heat hot water, sizing of flexible couplings, and so forth.

German-English Dictionary

A GERMAN-ENGLISH DICTIONARY of Automatic Control Terms by D. W. Pessen. Size 11 by 8½ in.; 18 pp; loose sheets. Published by The American Society of Mechanical Engineers, 29 West 39th St., New York 18, N. Y. Price 50 cents.

ABOUT 750 GERMAN words and their English translations and equivalents are listed in this dictionary. Current German-English scientific dictionaries do not list many of the terms found in this publication.

The aim of this dictionary is not to supplant but to supplement existing German-English scientific dictionaries to help in the understanding of German literature in the automatic control field.

In the appendix to this dictionary are listed German automatic control symbols and conventions.

On Electrical Equipment

ALTERNATING CURRENT MACHINES by A. F. Puchstein, T. C. Lloyd, and A. C. Conrad. Third edition; size 9 by 6 in.; 721 pp including index; illustrated; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. Price $8.50.

ENLARGED by about 20 per cent, the edition has significant changes in more detailed developments of equivalent circuits, vector diagrams, methods of calculating cross-axis voltages of synchronous machines and equations describing the oscillations of synchronous motors. Some of the newly added information is devoted to loading of polyphase transformers, adjustable speed drives, short circuit characteristics of alternators and rectifiers.

The book begins with an extensive section on transformers. It covers their construction, parallel operation, types, and polyphase transformer connections. The other main sections pertain to alternators, polyphase induction motors, single-phase induction motors, synchronous motors, alternators in parallel, synchronous converters, mercury-vapor rectifiers, single-phase commutator motors and repulsion motors.

At the end of the book, there are some practice problems pertaining to subject material in most of the book's 54 chapters giving the student an opportunity to apply information gleaned from the text.

On Controlling Quality

QUALITY CONTROL by N. L. Enrick. Second enlarged edition; size 9 by 6 in.; 181 pp including index; cloth bound. Published by the Industrial Press, 148 Lafayette St., New York 13, N.Y. Price $4.00.

NEW TEXT MATERIAL, tables and charts make this edition about 60 pages larger than the previous one. With the exception of two sections, which are not unduly difficult to understand, the author shies away from mathematical complications in his presentation. The book stresses applications and methods instead.

Among the 19 chapters in the book are the following: Fundamentals of inspection; installing process inspection; tolerances and allowances in interchangeable manufacture; mass production gaging; management aspects of quality control; control charts for per cent defective product.

Yearly Index

Watch for the index to Plant Engineering, Volume 8, 1954, in our January issue.

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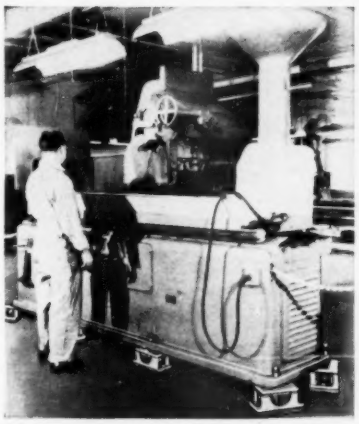
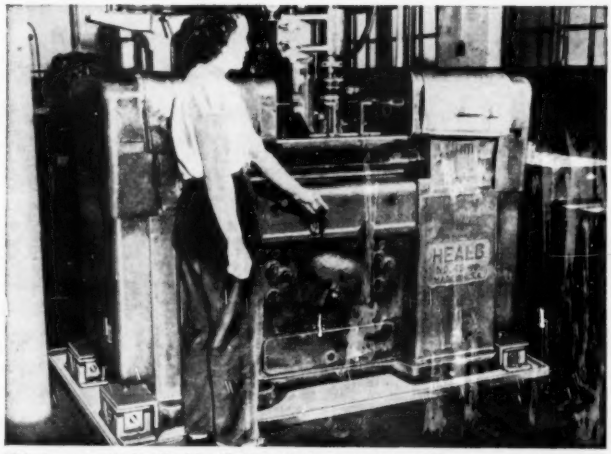


This Thompson 12" x 60" Surface Grinder is installed at Firth Sterling, Inc., Pittsburgh, Pa. Vibration from grinders affected precision testing equipment on floor below; vibration and noise was also extremely annoying in executive, sales and laboratory offices. Korfund Isolators directly under the grinders, completely solved the problem. Korfund Units stop vibration and insure quieter machine operation.

This Pratt & Whitney #3B Jig Borer is installed at Caterpillar Tractor Co., Peoria, Illinois. Korfund Vibro-Isolators protect this precision machine against severe external vibration from trucks and trains which had made accurate work impossible. Isolators are set in pockets made by removing wood block flooring. Korfund Units stop vibration and reduce rejects—improve work quality.



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SELECTING THE RIGHT CRUSHER*

For every crushing job there is always one specific type and size crusher that is more economical and efficient than all others—it's the machine that will give the desired finished product, in the volume required, at the lowest cost per ton. Yet, it is to be expected that the crusher manufacturer will limit his recommendation to the machine he makes. If he makes only one or two types of crushers his range of selection is limited. So is your chance of getting the best machine for your particular job. Always get an analysis and recommendation from the manufacturer that has a large and varied line.

PENNSYLVANIA CRUSHERS

Bradford Breakers
Bradford Hammermills
Bradmills
Reversible Hammermills
Non Reversible Hammermills
Ring Hammermills
Dixie Hammermills
Dixie Non Clog Hammermills
Single Rolls
Reversible Impactors
Kue-Ken Jaws
Kue-Ken Gyratories

*We will be glad to send you a copy of the Handbook of Crushing. This book contains data on mechanical size reduction that is not available anywhere else. Pennsylvania Crusher Company (division of Bath Iron Works, Inc.) Room 1763, West Chester, Penna.

For more facts circle 655 on Reply Card

IS THIS YOUR CONTROL PROBLEM?

1. How to indicate a change in resistance through a filter due to a clogging of the filter?
2. How to indicate a change in differential across an orifice due to a change in air flow conditions?
3. How to indicate an unbalanced condition of two air ducts?

MERCOID HAS THE SOLUTION

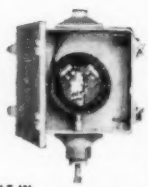
A Diaphragm Differential Pressure Control which operates from minute changes (.03 of water) in the difference between two pressures.

Ranges to cover most applications—(inches of water) 6" vac. to 6" press., and 30" vac. to 30" pressure.

MERCURY SWITCH EQUIPPED

DIFFERENTIAL PRESSURE CONTROL

EXPLOSION-PROOF HOUSING



AVAILABLE IN WEATHERPROOF HOUSING

WRITE FOR BULLETIN

THE MERCOID CORPORATION
4201 BELMONT AVE., CHICAGO 41, ILL.

NEW YORK 17, N. Y.
205 E. 42nd Street

PHILADELPHIA 32, PA.
3137 N. Broad Street

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LAZY LIQUIDS
KEPT ON THE MOVE

Maybe it is Asphalt, Rosin, Wax, Sulphur, Syrup or some other LAZY Liquid. Heat them and they flow more readily. Heat the pipes that convey them also—and they continue to flow.

Steam, Hot Water, Hot Oil, or Dowtherm circulated through Jacketed Piping and Fittings will do just that. Keep these otherwise lazy liquids on the move.

Parks-Cramer Jacketed Pipes come in sizes 1¼", 1½", 2", 3", and 4"—inside dimensions. Jacketed fittings include: two- and three-way Plug Cocks, Tees, 90° and 45° Elbows, Crosses, Expansion Joints and Relief Valves. Send for Bulletin 152 P.

Parks-Cramer Company
ENGINEERS and CONTRACTORS
Fitchburg, Massachusetts

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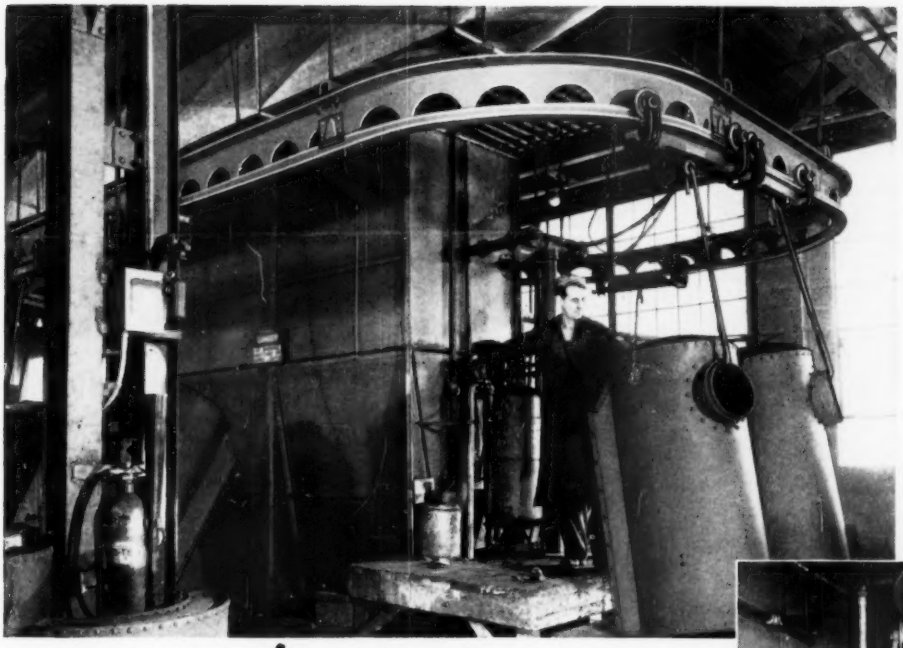


One man transfers furnace bodies, weighing 200 lbs., coming from welding booths to Tramrail track by means of a lift platform. Usually when he advances one carrier to spray booth, all 16 carriers must be moved at same time.

The curved track section is necessary to bring the furnace bodies near the water screen during spray painting so that paint in atmosphere will be removed properly. All points of a body are easily reached when supported overhead and the work is extremely fast.

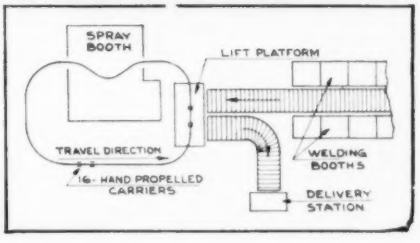
Easy Push Moves 16 Carriers on Spray Booth Loop

CAN one man push 16 loaded four-wheel carriers (with 64 wheels in all) around an enclosed Tramrail track loop having six left-hand and two right-hand curves?

That question bothered the Armstrong Furnace Co., Columbus, Ohio, one of the world's largest furnace manufacturers, when they were developing their paint-spray systems for painting furnace bodies. There was considerable fear that friction and binding of so many carriers would create too great a load for one man to push hundreds of times during a normal working day.

They now have two such systems in operation. One man easily moves the carriers even when all are loaded. Little effort is required because of ball-bearing wheels and hard smooth flat treads on both wheels and track and easy swiveling yokes.

The systems are extremely efficient, requiring only two men each. 300 furnace bodies can be painted with each, in an eight-hour period.



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BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

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THE CLEVELAND CRANE & ENGINEERING CO.
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CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

For more facts circle 659 on Reply Card

THE THREE CUTLER-HAMMER STARS ★ ★ ★

STAND FOR THREE NEW STANDARDS

☆ *Installs easier*

The cost of installing motor control today is usually much more than the cost of the control equipment, often two to three times as much. Thus this new control offers *large* savings.

☆ *Works better*

Users say, "Nothing like this ever before." Smooth, quiet operation with uniform response. New adjustable overload protection lets motors work harder with fewer nuisance interruptions.

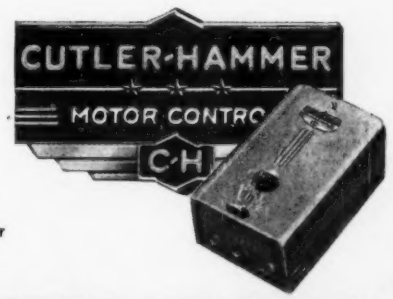
☆ *Lasts longer*

Revises all existing ideas of long trouble-free life in motor control. Cuts rate of wear to point that maintenance care and cost are virtually eliminated for 90% of all control uses.

Look for the three silver stars on the famous Cutler-Hammer nameplate; they identify the new spectacular Cutler-Hammer ☆☆☆ Motor Control. These three stars stand for three entirely new standards in motor control satisfaction and value. ☆ 1 . . . Easier, faster, lower cost installation any electrician can readily prove. ☆ 2 . . . Time-saving, trouble-saving, cost-cutting better performance which any test will confirm. ☆ 3 . . . Amazingly longer life due to advanced engineering features anyone can understand. Compare it by features and by performance. You too will say it is the finest control you know. CUTLER-HAMMER, Inc., 1447 St. Paul Avenue, Milwaukee 1, Wisconsin.

TRY IT!
COMPARE IT!
TEST IT!
PROVE IT!

Order from your nearby Authorized Cutler-Hammer Distributor today.



CUTLER-HAMMER ★★★ MOTOR CONTROL

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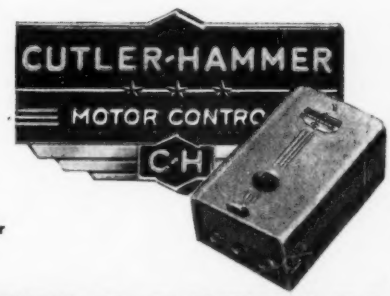

CUTLER-HAMMER ★★★ MOTOR CONTROL

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